ABSTRACT SECTION

0. GENERAL FORESTRY

01. TERMINOLOGY. BIBLIOGRAPHY. MATHEMATICAL AND STATISTICAL ANALYSIS

See *For. Abstr.* 12 (Nos. 2557–9, 2725, 2736, 2742, 2772, 3087, 3348, 3488–9, 3505).

02. DICTIONARIES. HANDBOOKS. GUIDES. LISTS OF VERNACULAR NAMES

See also *For. Abstr.* 12 (Nos. 2573, 2728).

2557. **Forestry terminology.** Society of American Foresters, Mills Building, Washington, D.C. 2nd ed. (rev.), 1950. pp. 93. Price $3.00.

Words have been included in this revision that were omitted under the procedures adopted for the 1st edition [cf. *For. Abstr.* 6 (212)], and added definitions have been supplied to some terms when needed. The revised edition is some 10 pages longer than the original.

2558. DAYTON, W. A. **Glossary of botanical terms commonly used in range research.** *Misc. Publ. U.S. Dep. Agric.* No. 110, Revised, 1950. pp. 41. Price 20 cents.

2559. **Guide to the use of Forestry Abstracts.** Commonwealth Forestry Bureau, Oxford. 1950. pp. 62. [E.F.Span.] Price 5*s*.

A key to the titles of publications regularly noticed, with their publishers and addresses; also notes on the decimal classification, analysis of an actual abstract title, language and library-source abbreviations, other abbreviations, and a glossary of some foreign terms.

05. PERIODICALS. ANNUAL REPORTS

See also *For. Abstr.* 12 (Nos. 2849, 2900–1, 3307).

2560. **Trees in South Africa.** The Arboricultural Society of South Africa, The University of Witwatersrand, Johannesburg. Quarterly. Price 1*s*. 3*d*. per copy.

Vol. 1, No. 1, for April/June 1949, contains some 20 pages. Abbreviation: *Trees S. Afr.*

2561. Tables des matières de 1893 à 1945. **[Indexes from 1893 to 1945.]** *Bulletin de la Société Centrale Forestière de Belgique*, Brussels [1950]. pp. 320. [F.] Price *Fr.*160.

Includes: (1) general subject index; (2)–(6) classified indexes of phytopathology, entomology, dendrology, timbers and exotic plants, dendrometry, ornithology; (7) index of plates; (8) index of books etc. announced, reviewed or abstracted; and (9) author index.

2562. Table générale des matières des années 1910 à 1945. **[Subject index for the years 1910–45.]** *Bulletin agricole du Congo belge*, Brussels. [1946?]. pp. 100. [F.] Price *Fr.*15.

2563. **Colonial Development Corporation: Report and Accounts for 1949.** H.M. Stationery Office, London. 1950. pp. 70 + 6 maps. Price 2*s*.

The Forestry Division reports briefly on three projects now being carried out:—(1) the Tanganyika Wattle Estates [cf. *For. Abstr.* 11, p. 425]; (2) Usutu forests, Swaziland [cf. *For. Abstr.* 11, p. 425] and (3) British Guiana timbers [cf. *For. Abstr.* 11, p. 422].

06. SOCIETIES. CONFERENCES

See also *For. Abstr.* 12 (No. 2643).

2564. **Constitution of the Van Premi Sangh [Forest-Lovers' Association.]** *Indian For.* 77 (1), 1951 (1–4).

2565. **Proceedings of the Third World Forestry Congress: No. 3. Special papers.** Helsinki. 1950. pp. 378.

Of the 76 papers here published, 60 were abstracted in *For. Abstr.* 11 (3), from summaries issued at the time of the congress. They are now printed in full in this volume of proceedings.

2566. **Proceedings of the Third World Forestry Congress: No. 4. Final Report.** Helsinki. 1950. pp. 221.

[Cf. *For. Abstr.* 11 (No. 1566).] In addition to recommendations and resolutions, gives an account of the Congress, list of members, etc.

07. EDUCATION AND RESEARCH. ARBORETA

See also *For. Abstr.* 12 (No. 2930).

2567. **Imperial Forestry Institute, Oxford: opening of new building by H.R.H. Princess Margaret, 19th October, 1950.** *Emp. For. Rev.* 29 (4), 1950 (316–33 + 7 photos).

Includes an historical account of the institute and an annotated list of the timbers used in the new building. [Cf. *For. Abstr.* 12 (No. 2967).]

2568. PAVARI, A. L'attività della Stazione Sperimentale della Selvicoltura nel primo venticinquennio. **[The first twenty-five years' work of the Florence Forest Experiment Station.]** *Pubbl. Staz. sper. Selv. Firenze* No. 7, 1950. pp. 126. 339 refs. [It.it.f.e.]

Includes bibliographies of publications by the staff.

2569. Metsätieteellinen tutkimuslaitos 1918–1948. **Forest Research Institute in Finland 1918–1948.** *Commun. Inst. for. Fenn.* 37 (3–4), 1949. pp. 35 + 37. [Fi.E.]

2570. MICHELSON, A. Quelques considérations sur les études forestières entreprises par le Comité National du Kivu. **[Some account of the forest research projects undertaken by the Comité National du Kivu [Belgian Congo].]** *Études for. Com. nat. Kivu* No. 1, 1950 (7–17). [F.]

2571. PAULEY, S. S. **Work of the Cabot foundation.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 2. X.

A brief summary of the work of the foundation in forest-tree genetic research since its beginning in 1937.

2572. MARCKWORTH, G. D. **Fundamental research in the growth of trees and stands at the College of Forestry [, University of Washington].** *For. Cl. Quart.* 24 (1), 1951 (3–7).

Fundamental research is being done on: (1) The mineral-nutrient requirements of *Pseudotsuga taxifolia, Tsuga heterophylla* and *Thuja plicata.* (2) Amount and character of litter returned to the soil by the above species. (3) The use of the dial-gauge dendrometer. (4) Succession on an area recently (1947) covered with glacial deposits. (5) Biology and control of barkbeetles (mainly *Pseudohylesinus* spp.) on Silver Fir [*Abies amabilis*].

2573. HILDEBRAND, F. H., and VERDUYN LUNEL, F. A. Bomen en sierheesters, voorkomende in de tuin van het Bosbouwproefstation te Bogor. **[Trees and ornamental shrubs in the Forest Research Institute's garden at Bogor.]** *Rapp. Bosbouwproefsta., Bogor* No. 41, 1950. pp. 23. [Jav.Du.E.] (*Serie Boomnamenlijsten* No. 25).

A brief note on the history of the garden, with alphabetical lists of the families and genera, and of the specific names with the vernacular Dutch or English equivalent, showing date of planting, provenance, and position in the garden of each species.

09.1. *Forest History*

See also *For. Abstr.* 12 (No. 2751).

2574. HORNSTEIN, F. Zur Entwicklungsgeschichte der Fichtenreviere und des Waldfeldbaues in Oberschwaben. **[History of the development of the Spruce districts and of alternate forest and field cropping in upper Swabia.]** *Forstwiss. Cbl.* 67 (2), 1948 (65–79). 15 refs. [G.g.]

An historical and pre-historical study of the Spruce districts of upper Swabia (i.e. the area between Lake Constance, the Danube and the Iller) shows that the southern part of this area originally consisted of mixed hardwoods and conifers, and the northern part of mixed hardwoods, with a heterogeneous transitional zone. Unregulated clear fellings, land clearance, burning for alternate forest and field cropping, and deliberate sowing and planting of Spruce have been responsible for the replacement of the mixed and deciduous forests by the present pure Spruce stands. A brief historical review is presented of the practice of alternating forest and field crops in this area and its adaptation to forestry.

2575. SZCZOTKA, S. Materiały do dziejów leśnictwa w Polsce. **[Records of the history of forestry in Poland.]** *Sylwan* 94 (2), 1950 (49–68). 19 refs. [Pol.russ.e.]

A contribution to the bibliography of forestry in Poland up to the 1795 partition. Contains: (1) an excerpt from Jan Ostrorog's 'Kalendarz

komarzenski' (The Komarno Almanack) published early in the 17th century and relating to the management of Oak forests; (2) a reprint from a 'Book for farmers', by Fr. P. Switkowski, published in 1785; the section reprinted is entitled 'Duties that every good forester should fulfil each month all the year round' and was first published in the 'New Almanack of Forestry and Manufactories for 1777'; (3) a reprint of an article by Fr. P. Switkowski, containing instructions for the sowing and planting of Birch, Elm, Poplar, Horse Chestnut, Walnut, Plane, Acacia, White Ash, Norway Maple, Ash-leaved Maple, Red Cedar and Laburnum, published in a Warsaw magazine in 1784.

2576. MEYER, K. A. Frühere Verbreitung der Holzarten und einstige Waldgrenze im Kanton Wallis. 1. Unterwallis. Linkes Rhoneufer. [**Former distribution of tree species and former timber line in the Canton of Valais. 1. Lower Valais. Left bank of the Rhone.**] *Mitt. schweiz. Anst. forstl. Versuchsw.* 26 (2), 1950 (683–750 + 5 photos). [G.]

2577. THOMPSON, H. N. **History of the forest department, Nigeria (1915–1925).** *Fm. & For.* 10, 1950 (54–64).
Cf. *For. Abstr.* 10 (No. 2390).

2578. [BRASNETT, N. V.] **A history of the Uganda Forest Department, 1898–1929.** *Bull. For. Dep. Uganda* No. 3, 1951. pp. 26. 22 refs.

09.2. *Pre-history. Pollen analyses, etc.*

See also *For. Abstr.* 12 (Nos. 2694, 2708–9, 2751).

2579. CHILDE, V. G. **Comparison of archaeological and radiocarbon datings.** *Nature, Lond.* 166 (4234), 1950 (1068–9). 1 ref.
Compares datings for a number of objects from sites which have been dated independently from archaeological evidence and by the radioactive carbon method, and concludes that much checking and refinement of the method is necessary before it can provide reliable dates for prehistoric events.

2580. MÜLLER-STOLL, H. Über die Erhaltungsfähigkeit des Holzes tertiärer Bäume und Sträucher. [**The durability of wood of trees and shrubs of the Tertiary period.**] *Senckenbergiana, Frankfurt a.M.* 28 (1/3), 1947 (67–94). Numerous refs. [G.g.] L.S.
Presents a list of fossil woods from the Tertiary period of central Europe, and discusses the reasons for their preservation. On the whole such fossil woods belong to genera or families that produce more or less durable timber in modern times. *Sequoia, Taxodium* and some Cupressaceae, in particular, are mentioned.

2581. HOPKINS, J. S. **Differential flotation and deposition of coniferous and deciduous tree pollen.** *Ecology* 31 (4), 1950 (633–41). 13 refs.
The buoyancy of a number of conifer and deciduous tree pollens was tested in beakers and two sedimentation tanks. The majority of those deciduous tree pollens tested sank rapidly, while bladder-equipped conifer grains tended to float. The degree of buoyancy in both types appeared to be species-specific. In a tank equipped with fan and wind tunnel, the ease with which a floating pollen mass is drifted, agreed with field observations of Wasmund and other European workers. The sinking of *Pinus resinosa* pollen was computed to be 4% during the first 10 min. followed by little sinking for the next 12 hours, but averaging a total of 8·8% by the end of 120 hours. Size-frequency studies of those grains that floated as compared with those that sank, indicated that many of those that sank were grains with small bladders in proportion to their grain sizes.
It was concluded that the observed sinking of a small % of *Pinus resinosa* and like-behaving conifer pollens could account for their presence in deep-lying lake and marine sediments despite their reported buoyancy. The prevailing opinion, that differential flotation is not a serious source of error in pollen analysis, is based on reports that pollen spectra obtained from variously formed peats are comparable with those from lake and marine sediments. The interpretation of these data is questioned since the pollen spectra from lake and marine sediments may be distorted by differential flotation, and if there is a real agreement with spectra from bogs the latter must also be distorted by some other compensating circumstance.
In size-frequency studies of fossil Pine pollens, there is a possibility that the sizes of grains deposited in sediments formed beneath

open water are more variable than those found in sediments not so formed. The marked difference in the degree of flotation between pollens of some Pine species indicates that the relative abundance of their pollen in bottom sediments would not show the original relationships that existed between their respective pollen rains.

Present efforts to detect short climatic rhythms in pollen spectra demand closer attention to differential flotation of pollen. This is especially true in North America where the majority of sediments are of glacially formed bog-lake types with few differently formed deposits to serve for comparative purposes. *From author's summary.*

2582. HANSEN, H. P. **Pollen analysis of three bogs on Vancouver Island, Canada.** *J. Ecol.* 38 (2), 1950 (270–6). 9 refs.

2583. POTZGER, J. E. **Pollen study in the Quetico-Superior Memorial Forest (A preliminary report).** *Abstr.* in *Amer. J. Bot.* 36 (10), 1949 (819). O.B.D.

2584. BROCKMAN, C. F. **Washington's stone woodpile.** *Amer. Forests* 56 (12), 1950 (26, 28, 41).

Describes the formation of the fossil forest in the Ginkgo State Park, Washington.

2585. CROCKER, R. L., and WOOD, J. G. **Some historical influences on the development of the South Australian vegetation communities and their bearing on concepts and classification in ecology.** *Transactions of the Royal Society of South Australia Incorporated, Adelaide* 71 (1), 1947 (91–136). Numerous refs. H.S.B.

Analyses some factors affecting the development of the Australian flora in the light of modern knowledge of the geological, pedological, and ecological pattern of Australia and in relation to recent paleobotanical literature. *From authors' summary.*

09.3. *Biographies*

See also *For. Abstr.* 12 (No. 2729).

2586. BOURGENOT. Un portrait de Gurnaud. [**A portrait of Gurnaud.**] *Bull. Soc. for. Franche-Comté* 25 (16), 1950 (680–96). 37 refs. [F.]

A critical account of the ideas and opinions of A. Gurnaud, the pioneer of the 'méthode du contrôle', and the way in which his ideas were applied and adapted by his disciples.

09.4. *Forest Statistics*

2587. SAARI, E. Suomen metsäteollisuuden raakapuun saanti metsätaseen kannalta tarkasteltuna. 1. Koko valtakunnan yleisselvittely. [**The supply of wood as raw material for the Finnish forest industries. 1. Totals for the whole country.**] *Julk., Metsateho, Helsinki* No. 16, 1948. 40 refs. [Fi.e.]

2588. MALLET, J. Valeur économique de la forêt pyrénéenne. [**Economic value of the [French] Pyrennean forests.**] *Trav. Lab. for. Toulouse* 1 (5), Art. 1, 1950. pp. 32. [F.]

Statistics based on a recent inventory, and covering the forests of the departments of Gers, Basses-Pyrénées, Hautes-Pyrénées, Haute-Garonne, Ariège, Aude, and Pyrénées-Orient. The following data are tabulated:—(*a*) forest area (1) by departments, (2) by topographical regions, (3) by silvicultural systems; (*b*) distribution and proportion of principal species; (*c*) estimation of forest capital and (*d*) estimated revenue in 1948, both by departments; and (*e*) area, capital and revenue by species and silvicultural systems.

2589. HAGBERG, E. Den skogliga utvecklingen i Sydsverige under det senaste kvartsseklet. [**Forestry developments in southern Sweden during the last quarter of a century.**] *K. LantbrAkad. Tidskr., Stockh.* 89 (4), 1950 (304–14). [Sw.e.] E.M.B.

Figures from surveys made between 1923 and 1928, and 1945 and 1948, show an increase in timber volume amounting to 26% for the 4 southern provinces and 39% for Småland. Data are also given for individual species, forests classed by ownership, and for counties.

2590. Verliezen aan onze houtopstanden hoofdzakelijk toegebracht gedurende de oorlogsjaren. [**Losses to our stands of timber, particularly those caused during the war.**] *Ned. Boschb.-Tijdschr.* 22 (12), 1950 (358–67). [Du.]

Data, collected by the statistical division of the State Forest Service, are tabulated by

provinces for loss of conifers, hardwoods, coppice, osier beds and roadside plantings.

2591. ZUBOVIĆ, J. Šumska površina Srbije. **[The area of forest in Serbia.]** *Glasn. šum. Fak., Beograd* No. 1, 1950 (41–51). [Serb.f.]

Data are given of the total forest area by districts, and the forest area in relation to the population and to other crops.

2592. **The Canada year-book 1950. Chap. XII. Forestry.** Dominion Bureau of Statistics, Department of Trade and Commerce, Ottawa. 1950. pp. 458–79. O.R.E.

The forestry section of the yearbook presents statistics for 1937–47 and information on the following aspects of Canadian forestry: forest reserves, depletion and increment, administration, fire protection and losses, and production and consumption of various forest products.

2593. CUNNINGHAM, R. N. *et al.* **Forest resources of the Lake States region.** *For. Resour. Rep. U.S. For. Serv.* No. 1, 1950. pp. 57. 48 refs.

2594. AMIDON, G. B. **Status of forestry in the pulpwood industry in the Lake States.** *Paper Tr. J.* 132 (2), 1951 (32, 34, 36). P.R.

Analyses the available forest-survey figures showing a very serious overcut of Spruce, while Aspen is produced in quantities below the allowable drain. Indicates the problems to be solved to ease the extremely serious supply situation.

2595. TOOLE, A. W. **Forest resources in the [Michigan] copper country: a basis for industrial development.** Forest Products Research Division, Michigan College of Mining and Technology, Houghton, Mich. 1949. pp. 42. 4 refs.

09.7. *Monographs of Individual Forest Regions*

See also *For. Abstr.* 12 (Nos. 3546–7).

2596. SALDARELLI, R. La foresta demaniale di Ficuzza. **[The State forest of Ficuzza.]** *Monti e Boschi* 2 (2), 1951 (70–80). [It.f.e.]

Description and history of one of the few surviving forests in Sicily.

2597. HUBERMAN, M. A. **Asian and Pacific forestry.** *J. For.* 48 (7), 1950 (481–90). 99 refs.

Brief notes on the principal countries of these regions.

2598. MAYER-WEGELIN, H. Waldwuchs und Waldwirtschaft in Nah- und Mittelost. **[Forest growth and forest management in the Near and the Middle East.]** *Repr.* from *Übersee-Rundschau* No. 8, 1950 (258–60). [G.] P.R.

Describes the forests of Turkey, Syria, Palestine, Irak, Iran and Afghanistan, their produce, organization of wood supply, and afforestation measures.

2599. CHATURVEDI, M. D. **Tour note on the forests of Orissa.** [Government of India.] 1950. pp. 25 + 4 photos.

In addition to a general account of the forests, the following points are discussed: (1) the management of *Dendrocalamus strictus* for pulp manufacture, (2) Casuarina plantations for dune fixation, and (3) the possibility of settling on the plains, the nomadic Gondhs, who at present practice a primitive shifting cultivation in the forests.

2600. ROSAYRO, R. A. DE. **Forests and forestry in Ceylon.** *Ceylon Trade Journal* 15 (8), 1950 (451–7).

2601. ALLOUARD, P. Les forêts et les industries forestières au Mexique. **[Forests and forest industries in Mexico.]** *Bois For. Trop.* No. 15, 1950 (223–34). [F.e.span.]

1. FUNDAMENTAL NATURAL LAWS OF THE FOREST

11.1. *Atmosphere. Meteorology*

11.14. Precipitations. Evaporation. Humidity

2602. BAUMGARTNER, A. Niederschlagsschwankungen und Dürregefährdung mit Bezug auf den Waldbau. **[Fluctuations in precipitation and drought danger with reference to silviculture.]** *Forstwiss. Cbl.* 69 (11), 1950 (636–62). 112 refs. [G.g.] [Meteorologisches Institut der Forstlichen Forschungsanstalt, München.]

A study, based on a review of literature, of fluctuations in precipitation in Germany (particularly over the last 100 years), in an effort to estimate the probable occurrence of drought periods when planning silvicultural operations. On an average, one year of severe drought may be expected every 10 or 11 years; but once in about every 4 years, a year with a period of severe drought is likely to occur.

2603. FOURCHY, P. Sécheresse—variations climatiques et végétation. **[Drought—climatic variations and vegetation.]** *Rev. for. franç.* 1951 (1), (47–55). 13 refs. [F.]

Discusses the abnormally dry period 1942–9 in France, and adduces evidence, from the recession of glaciers and changes in vegetation, that this was part of a genuine climatic change.

2604. ATWATER, M. M., and KOZIOL, F. C. **The Alta avalanche studies.** U.S. For Serv. 1949. pp. 96.

Digest and analysis of snow studies, designed for the instruction of forest personnel who have duties in ski-ing areas.

11.16. Electricity. Radiations other than Light

2605. AALTONEN, V. T. Maansäteily metsäteily metsäpuiden kasvutekijänä. **[Earth rays as a growth condition of forest trees.]** *Commun. Inst. for. Fenn.* 37 (9), 1950. pp. 48. 14 refs. [Fi.g.]

The author reports on an experiment in which he laid out sample plots in different forest stands, each plot being subdivided into quadrats, and then got a dowser to go to and fro, following the 'earth-ray lines' [Bodenstrahlungslinien], which he then plotted on a plan. The lines were most frequent on those plots with the highest-yielding soils (reckoned by vegetation types), increasing in the order *Cladina, Calluna, Vaccinium, Myrtillus,* and *Oxalis–Myrtillus* type.

11.2. *Climate and Microclimate*

See also *For. Abstr.* 12 (Nos. 2602–3, 2733, 2755, 2757, 2763, 3494 *et seq.*).

2606. LÜDI, W., and ZOLLER, H. Über den Einfluss der Waldnähe auf das Lokalklima. **[The influence of the proximity of forests on local climate.]** *Bericht über das Geobotanische Forschungsinstitut Rübel in Zürich für das Jahr 1948,* 1949 (85–108). [G.] L.S.

Observations were made and recorded continuously from May 1943 to May 1944 to find the effects on local climate of a clearance of the Hard forest near Muttenz. Four observation posts were set up south of the cleared forest, one in the neighbouring forest, one on the forest margin and two 35 and 100 m. respectively away from the margin. In comparison with the cleared areas the forest had a relatively cool climate and relatively more uniform atmospheric humidity, and less evaporation took place. The forest also afforded protection from the wind and reduced the resultant drying effects over a considerable distance. Findings are graphed.

11.4. *Soil*

2607. TARRANT, R. F. **A guide for forest soil examination in the Douglas-Fir region.** Pacif. Nthwest. For. Range Exp. Sta. Revised, 1950. pp. 32 + iii. 22 refs.

Defines and discusses some soil-science terms, with a key for classifying soils in the area, and describes methods and equipment used in soil sampling and examination.

11.41. Soil Physics

See also *For. Abstr.* 12 (Nos. 2609, 2635).

2608. HALE, C. E. **Some observations on soil freezing in forest and range lands of the Pacific Northwest.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 66, 1950. pp. 17. 7 refs.

A preliminary study carried out in the winter and spring of 1949–50 showed that frost is not a danger in the dense forest types of the Cascade Range; no further study is proposed in this area. Up to 7·5 in. of soil freezing occurred through the winter and spring in Ponderosa Pine/grass, grass and Sagebrush types of eastern Oregon and Washington. The exact effect on run-off and infiltration cannot be determined from this preliminary study, but indications are that frost has a decided effect on the entry of spring snow-melt water to the subsoil. In the Ponderosa Pine/grass type, surface run-off from melting snow

occurred over 1 in. of soil freezing. Very favourable conditions for severe soil erosion were present in the Sagebrush type during the spring melting period.

11.42. Soil Chemistry

See also *For. Abstr.* 12 (Nos. 2635, 2640).

2609. YEN, P. C., and HSU, W. C. **Some physical and chemical properties of the soils of Pei-shan village, Yung-tai county, Fukien.** *Fukien agric. J.* 11 (3/4), 1950 (179–87). [Chin.e.]

These soils vary from sandy loam to clay. Soil organic matter is deficient in all, except under Bamboo, where there is 2·2% organic-matter content in both surface soil and subsoil. It is concluded that the deep-rooting habit of the Bamboo prevents leaching.

11.43. Biology of Soil, including Mycorrhiza

See also *For. Abstr.* 12 (Nos. 2633, 2856–7, 3421).

2610. BRIAN, P. W., WRIGHT, J. M., STUBBS, J., and WAY, A. M. **Uptake of antibiotic metabolites of soil micro-organisms by plants.** *Nature, Lond.* 167 (4244), 1951 (347–9). 11 refs.

2611. BRIAN, P. W., CURTIS, P. J., and JEFFERYS, E. G. **Antibiotics produced by fungi isolated from poor heath soils.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. 3 refs. X.

A number of pure antibiotics were isolated from fungi (*Penicillium* spp., *Trichoderma viride*, and *Verticillium* sp.) obtained from acid heath soils such as commonly support conifer plantations in England. The properties of these substances were determined with a view to assessing the possible rôle of antibiotics in soil ecology. [Cf. *For. Abstr.* 12 (No. 1572).]

2612. Inventaire de la microflore des sols forestiers. [**Inventory of the microflora of forest soils [in the Yangambi region of the Belgian Congo].**] *Rapp. Inst. nat. Étude agron. Congo Belge 1949*, 1950 (47–52). [F.]

Counts made on a number of different sites have shown that the abundance of the microflora of superficial forest soils is intermediate between that of naked soils and that of soils covered with *Paspalum*. Below a depth of 50 cm. the microflora is more abundant in the absence of vegetation than under *Paspalum* or forest cover. There appears to be a correlation between physical or physiological dryness of the soil and the relative abundance of actinomycetes. A species of *Trichoderma* is dominant in forest soils, while *Penicillium* spp. predominate in the other two biotypes.

2613. Évolution de la microflore au cours de la culture et de la jachère. [**Changes in [soil] microflora in the course of shifting cultivation.**] *Rapp. Inst. nat. Étude agron. Congo Belge 1949*, 1950 (48–50). [F.]

(1) *Soil microflora after felling and burning the forest.* The wood ash resulting from this process stimulated an immediate and considerable increase in the soil microflora, particularly the bacteria, and a change in the relative abundance of species, *Trichoderma* sp. showing a sharp decline and *Penicillium* spp. an intense multiplication. The recrudescence of root diseases in perennial cultivated plants on burnt-over land may be due to this diminution in the relative abundance of *Trichoderma* sp. which produces very active antibiotic substances. [Cf. *For. Abstr.* 11 (No. 653).]

(2) *Soil microflora during the forest fallow.* Soils were examined from two plots cultivated successively for rice and ground-nuts after burning of the forest, and at present covered respectively by a stand of *Musanga smithii* and an old Banana plantation. The latter had a more abundant soil microflora persisting to a greater depth, a higher content of humous material and greater speed of nitrification. *Trichoderma* were relatively more abundant in the former.

2614. PEYRONEL, B. L'étude des mycorhizes par l'observation directe. [**Study of mycorrhizae by direct observation.**] *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 2. [F.] X.

Emphasizes the importance of study *in situ* and gives some results of such observations. The author affirms that every fruiting body of mycorrhizal origin has a corresponding specific type of mycorrhiza, and that there is often a remarkable similarity between the structure of the mycelial sheath and that of the stem base and cap of the associated fruiting body. It seems that, in a great many cases, the mycelial

sheath does not replace the root hairs in absorbing water and nutrient substances, but this function is performed by the network of mycelia in the humus, which then conveys them to the mycorrhiza itself. A definite relationship also exists between illumination and the degree of mycorrhizal infection.

2615. DRIVER, C. H. **Morphology of mycorrhizae of *Liriodendron tulipifera*.** *Abstr.* in *Journal of the Tennessee Academy of Science, Nashville* 25 (3), 1950 (224). (*Proceedings of the Eleventh Annual Meeting of the Association of Southeastern Biologists.*) L.S.

2616. HARLEY, J. L., and MCCREADY, C. C. **The uptake of phosphate by excised mycorrhizal roots of the Beech.** *New Phytol.* 49 (3), 1950 (388–97 + 3 photos). 6 refs. [Department of Botany, University of Oxford.] O.R.S.

Excised apices of Beech roots were exposed to culture media containing phosphate as P^{32}. Samples of apices of mycorrhizal roots were found to absorb phosphate more rapidly than samples of uninfected roots of equal surface area or fresh weight. The P absorption appears to depend mainly on metabolic processes since it is diminished by factors affecting the rate of O uptake by the root.

2617. GRASSÉ, P.-P. Termites et sols tropicaux. **[Termites and tropical soils.]** *Rev. int. Bot. appl. Agric. trop.* 30 (337/338), 1950 (549–54). 6 refs. [F.] P.R.

Discusses the part played by termites in West Africa in preventing the formation of humus in forest soils and in forming new layers of soil above the laterite in savanna areas.

2618. JAHN, E. Bodentieruntersuchungen in den Flugsandgebieten des Marchfeldes. (Untersuchungen über die Bevölkerungsdichte von Bodentieren in Düne und verschiedenen alten Beständen der ersten Waldgeneration.) **[Soil fauna studies in the Marchfeld sand-dune area. (Investigations into the density of soil fauna populations in dunes and in variously aged stands of the first forest generation.)]** *Z. angew. Ent.* 32 (2), 1950 (208–74). 54 refs. [G.g.]

Good opportunities for a comparison of soil fauna in (1) treeless sites, and (2) forests of various ages on the same type of soil as the treeless sites, are afforded by the Marchfeld area, north-east of Vienna, where sand-dune afforestation has been going on for over 100 years. An intensive study was made of soil fauna in (*a*) treeless sand dunes, (*b*) a 14-year-old Austrian Pine stand, (*c*) a 46-year-old Austrian Pine/Oak stand, and (*d*) a 92-year-old Austrian Pine stand. The results are presented and discussed. There is a marked rise in numbers of soil fauna in wooded sites compared with treeless sites, and a further marked rise in older as compared with younger stands. Seasonal fluctuations were similar in all 3 types of stand, but vertical migrations in the soil and litter varied according to the stand and the season. It was clear that soil conditions become more favourable for the increase of soil fauna with afforestation and with increasing age of the forest, owing to the greater amounts of organic substance in the soil and improvements in its physical condition, the litter being particularly important in affording protection. It follows also that the breakdown of the litter takes place much more quickly in the older stands than in the younger. [Cf. *For. Abstr.* 12 (No. 930).]

2619. [MURPHY, P. W.] **[Mesofauna of Yorkshire moorland soils.]** *Rep. imp. For. Inst. Oxf. 1949–50*, 1951 (9).

It is found that the Acari in these soils tend to be much smaller than in other habitats that have been reported on. Afforestation produces a tendency towards a richer fauna of larger size with a greater proportion of Oribatid mites and fewer Trombidiformes.

2620. DRIFT, J. VAN DER. De bodemfauna in onze bossen. **[The soil fauna in our woods.]** *Ned. Boschb.-Tijdschr.* 21 (2; 3), 1949 (31–43; 67–76). 10 refs. [Du.]

Different classifications of soil fauna by size, presence in different soil layers, and feeding habits, are outlined, and various methods of determining quantitatively the fauna present in different soils are described. Results of an investigation of the numbers of different species of meso- and macrofauna in different layers of a Beech-wood soil are tabulated. Earlier research on the effects of the soil fauna on the environment by movement, breathing, eating, and excretion, is summarized. Results of investigations on the daily consumption of litter from different tree species by different species of fauna, and the varying amounts eaten by *Cylindrojulus silvarum* at different stages of

development are tabulated. The total amount of litter consumed during the 6 summer months by *C. silvarum* at different stages present on 1 sq. m. of a Beech-wood soil is estimated at 27·7 g., or 7% of the total litter to fall annually on the area. Experiments with *C. silvarum* also showed that much more old than fresh litter was consumed. Microscopic examination of the excreta of soil fauna showed that they consist mainly of pieces of litter, ± 0·01 sq. mm., still clearly showing cellulose and lignin reactions. Previous investigations on the possibility of increasing the quantity of fauna present in the soil are discussed.

11.44. Litter. Surface Humus

See also *For. Abstr.* 12 (Nos. 2572, 2618, 2620, 2636–7, 2640).

2621. BEIJERINCK, W., and PELKWIJK, A. J. TER. Bladverteringsproeven aan het Biologisch Station te Wijster [I], II. [**Experiments on leaf decomposition at the Wijster Biological Station [I], II.**] *Ned. Boschb.-Tijdschr.* 21 (2), 1949 (44–8), 9 refs. [Du.]; 22 (1), 1950 (5–11). [Du.e.] (*Mededeling van het Biologisch Station te Wijster*, Nos. 42, 47.)

I.—In the first series of experiments, filter paper was placed between the soil and a freshly fallen leaf layer and left for a year. At the end of this time, leaf decomposition was furthest advanced for Oak and *Amelanchier laevis* mixed, followed in order by Oak alone, Larch and *A. laevis*, Larch and *Prunus serotina*, Scots Pine and *A. laevis*, Larch alone, and Spruce alone. Decomposition of the filter paper was parallel to that of the leaves except that the filter paper in the mixture of Larch and *P. serotina* was further decomposed than that in Larch and *A. laevis*. In the second series of experiments, results of which are tabulated, leaves of each of 7 species were placed, with water of different pH values, in flasks, and filter paper was laid in the top layer of leaves, just above the water level. Visible decomposition of the filter paper took place only in the flask containing leaves of *Alnus incana*. The filter papers were all strongly coloured, with specific colours for the different species. Whatever the pH of the original water, the final pH value was approximately the same within each species.

II.—In further series of experiments, more detailed examination was made of the structure of the leaves and of the fibres of the filter paper at different stages, to determine the degree of decomposition. Decomposition of leaves in sample areas in the field was in the following order of decreasing rapidity: (1) Oak and *Amelanchier laevis*, (2) Oak alone, (3) Spruce and *A. laevis*, (4) Larch and *A. laevis*, (5) Scots Pine and *A. laevis*, (6) Larch and *Prunus serotina*, (7) *A. laevis* alone, (8) Larch, (9) Pine, and (10) Spruce alone. Decomposition of filter paper placed between the soil and a layer of freshly fallen leaves was most rapid for (1) followed in order by (2), (7), (3), (6), (5), (10), (4), (8) and (9). In another series of experiments, flower-pots were filled with leafmould, sand, or peat, topped with a layer of leaves about 8 cm. thick, buried, to just below the rim, in the forest, and covered with a piece of oxidized wire netting. Pieces of filter paper were put between the leaves and the soil. Results are tabulated. Filter paper on leafmould decayed very rapidly, regardless of the species of the leaf layer; on sand and peat it decomposed more slowly, the rate varying with the covering species. The nature of the soil had less effect on the decomposition of the leaves themselves, but *P. serotina* decomposed very rapidly on leafmould. It is concluded that the most important factors in the decay of cellulose are the moisture of the surroundings, the nature of the soil, and the species of leaves involved.

2622. [HANDLEY, W. R. C.] [**The formation of raw humus.**] *Rep. imp. For. Inst. Oxf. 1949–50*, 1951 (9).

Investigation of the mechanism of raw-humus formation was continued. From the results so far obtained, it seems probable that raw humus is associated with the formation, in the dying leaf, of a protein complex that is resistant to decomposition under some conditions. It is likely that these complexes have a variable resistance to breakdown, depending on the kind of micro-organism, the environmental conditions in the surface layers of the soil, and the plant species from which the complexes originate.

2623. BROADFOOT, W. M. **Redcedar litter improves surface soil.** *Sth. For. Notes Sth. For. Exp. Sta.* No. 71, 1951 (3).

Measurements under 15- to 20-year-old *Juniperus virginiana* on eroded soils in Mississippi showed a new A_1 horizon development of

1·7 in. compared with 1·3 in. under adjacent herbaceous cover. The surface soils under *J. virginiana* had more large pores and transmitted water several times faster; they had 5·3% organic matter—nearly twice as much as soils under herbaceous cover, and more than twice as much available Ca; pH was 6·75 compared with 5·71 under herbaceous cover. Amount of litter/acre was 3 tons more under *J. virginiana*, and each unit of litter contained 5 times as much Ca and twice as much excess base for neutralizing soil acidity. [Cf. *For. Abstr.* 12 (No. 1731).]

2624. ALLEN, J. W. **How close can logging leftovers be utilized.** *J. For.* 49 (2), 1951 (104–6).

Discusses the dangers of leaving (1) too much, (2) too little, slash and litter in the forest. The latter is now becoming a real danger in the USA, particularly in farm woodlots, now that utilization in sawmills is closer and the use of portable chippers is increasing.

11.45. Geological Conditions

See also *For. Abstr.* 12 (Nos. 2648, 2839).

2625. RAWITSCHER, W. Die Tiefe der Gesteinzersetzung, ein wichtiger ökologischer Faktor in den Tropen. [**The depth of rock decomposition, an important ecological factor in the tropics.**] *Vegetatio* 2 (1), 1949 (14–9 + 6 photos). 12 refs. [G.f.] [University of S. Paulo.] A.P.B.

A discussion of such decomposition, its causes, and effects on vegetation, with illustrations from Brazil. [Cf. *For. Abstr.* 11 (Nos. 42, 142).]

11.47. Soil Fertility. Maintenance of Favourable Soil Conditions

See also *For. Abstr.* 12 (Nos. 2824, 2838, 2919–20, 3085, 3122–3, 3346, 3525–6).

2626. AALTONEN, V. T. Die Blattanalyse als Bonitierungsgrundlage des Waldbodens. [**Chemical analysis of foliage as a basis for assessing the quality of forest soils.**] *Commun. Inst. for. Fenn.* 37 (8), 1950. pp. 41. 15 refs. [G.fi.]

The data obtained for this study, and presented in a number of tables, include the ash, SiO_2, K_2O, CaO, MgO, P_2O_5, $Al_2O_3 + Fe_2O_3$, and N contents, ether-, alcohol- and water-soluble substances, hemicelluloses, lignin fraction, cellulose, and raw protein, in the foliage of Scots Pine, Norway Spruce, and Birch (*Betula verrucosa* and *pubescens*) on each of 4 vegetation types—*Calluna* (*CT*), *Myrtillus* (*MT*), *Vaccinium* (*VT*), and *Oxalis-Myrtillus* (*OMT*)—and, in the case of conifers, for needles of different ages. No correlation was found between the chemical constituents of Pine and Spruce needles and the vegetation type, but the ash, K_2O, and CaO content of Birch leaves increased and the P_2O_5 content decreased in the order *CT*, *VT*, *MT*, and *OMT*.

2627. YOUNG, H. E. **The response of Loblolly and Slash Pine to phosphate manures.** *Queensland Journal of Agricultural Science, Brisbane* 5 (2), 1948 (77–105). H.S.B.

Describes experiments to test the response of *Pinus taeda* to various levels of soil phosphate. Different treatments were given to experimental plots in 1939, four levels of superphosphate being added to the soil, with one control. Measurements of d.b.h. and height were made annually and analyses for P content of soil were done in 1939, 1943 and 1946. As a measure of soil P content the total P value of a sample taken from the top 4 in. of soil was used. An application of 818 lb./acre of superphosphate was found most suitable, since it produced the greatest diameter increment and the largest profits both from merchantable thinnings and total volume. Rock phosphate was found to be as efficient as superphosphate and is much cheaper. Analyses were also made of P content of needles of *P. taeda* and *P. caribaea* in treated plots and results are correlated with growth increment and soil P values. The use of a needle P factor in determining the requirements of trees for P is described and discussed. [Cf. *For. Abstr.* 2 (322).]

2628. VIRO, P. J. **Fertilization trials on forest soils.** *Commun. Inst. for. Fenn.* 37 (7), 1950. pp. 23. 15 refs. [E.e.fi.]

Three methods of fertilizing were tested on sample plots [no replication] in a 40-year-old, stunted, chlorotic stand of Scots Pine on a coarse soil very poor in mineral nutrients. Bog peat + lime was the most effective, followed by a complete inorganic fertilizer; simple liming was the least effective. All treatments increased increment in the following 5 years.

Measurements were made of the chemical constituents of foliage on (1) limed and (2) unlimed plots. Pine needles on (1) contained 6–9% more CaO and more SiO_2 than those on (2). Birch leaves contained 20% more CaO, 45% less K_2O and rather less SiO_2 on (1) than on (2). There was no difference in CaO content of Spruce needles on the different plots but those on (1) contained more K_2O, and less MgO and SiO_2 than those on (2).

2629. Blokhuis, J. L. W. De invloed van kalk bij de aanleg van bos op heidegrond. **[The influence of lime in the afforestation of heathland.]** *Ned. Boschb.-Tijdschr.* 22 (3), 1950 (70–2). [Du.]

Series of experimental plots were laid out in 1936, treated with different quantities of lime, and planted with Japanese Larch and with Oak. Measurements of height growth and pH in 1948 are tabulated. The height growth of both species is generally significantly increased over that on control plots. The pH of the plots is, however, lower than in 1935. In another series using similar quantities of lime, a crop of lupin was grown on the plots in 1936 before planting in 1937 with Oak, Sitka Spruce, Norway Spruce, and Douglas Fir. Measurements made in 1949 showed in all cases greater height growth for trees on treated than on untreated plots.

2630. Brantseg, A. Granas veksthemning. **[Checking of growth of Spruce.]** *Repr.* from *Skogen og Klimaet* 1946 (63–78). [Nor.] Published by Bergens Museum (Det Geofysiske Institutt), 1948.

The cause of growth check and previous research thereon are discussed and various attempts to combat checking are described. Experiments were begun at the Vestland Forest Research Station in 1943 on destroying heather by burning and by treatment with $NaClO_3$ and $CaCN_2$. Trees planted on the burnt land were in reasonably good condition after 2–3 years. Burning is not feasible on sites liable to wind erosion, and heather reappears in a few years in the moist climate of West Norway. It is too early to estimate the effect of the chemicals, but heather appears to tolerate large quantities of either where rainfall is high. Flat-root planting, where the roots are spread and remain in the upper humus layer (where temperatures are higher) is found more satisfactory than deep-root planting. Experiments were made on the addition of 20 g. of $Ca(NO_3)_2$, superphosphate or K fertilizer, or 50 g. of lime, to the planting earth of trees planted by both methods; it is too early for definite results, but trees planted by the flat-root method, with the addition of lime and superphosphate, show particularly good height growth. Experiments begun privately in 1941 on the use of a fertilizer containing 0·16% N, 15·2% P_2O_5 and 34·7% K, and of $CaNH_4(NO_3)_3$ suggested by 1945 that the growth check had been avoided in treated trees. Trees planted by a landowner in 1939 with Tunis salt mixed in the planting soil appeared in 1944 to have escaped the growth check, but lack of controls prevented conclusive results; it is suggested that Tunis salt may free plant nutrients from the soil by ion exchange. Experiments were begun at the Research Station in 1944 on planting 2/0 Spruce in pots with soil from different areas where growth check prevails, with and without the addition of fertilizers and trace elements, in the form of water-soluble salts, and with nursery soil. Height growth in 1946 is shown in a graph; best results were obtained from the addition of Ca and of P.

2631. Robak, H. **Growth check in young Spruce on heath in western Norway.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. X.

Considerable variations in soil quality are found on the west Norwegian heaths, where the vegetation is dominated by *Calluna*, other ericaceous spp. and *Empetrum*. Although of podzolic nature the soil is seldom typically podzolized. The humus layer is usually fairly rich in mineral substances and has a high water content for most of the year. On *Calluna*-dominated heaths young Spruce suffer a growth check lasting for some 10–30 years, according to the variations in humus quality. They usually recover, however, and make good growth, having developed a wide-spread root system. When grown under *Pinus sylvestris* or *P. mugo*, Spruce escape 'check' if the shelter is removed gradually, leaving no openings for reinvasion by *Calluna*. Some growth response has been obtained with Spruce on 'check soil' by heavy liming and working of the soil in large plant holes during the autumn before planting. A direct addition of about 5 g. of limestone meal to each plant, combined with the so-called

'flatroot' planting, has successfully eliminated 'check' for 4–5 years, i.e. brought the Spruce beyond the 'check' period, on the mildest type of *Calluna* humus. Superphosphate has also given a distinct response. Considerable growth promotion is still shown where, in 1931, $CaCN_2$ was added in quantities sufficient to kill the *Calluna*.

2632. LEYTON, L. **The growth and mineral nutrient relationships of trees growing on *Calluna*-dominated sites.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. X.

A study of rooting habits and mineral-nutrient relationships in coniferous species growing on *Calluna*-dominated sites. Experiments were made to compare the effects of screefing and those of graded applications of P fertilizer on the growth of Spruce and Pine on such sites. The results suggest that the growth of Spruce is intimately connected with its N status and that there is a close relationship between the N nutrition of Spruce and *Calluna*, but that no such relationship exists between *Calluna* and Pine. These facts are undoubtedly connected with the rooting habits of the 3 species. Significant differences were found in the nutrient status of *Calluna* communities on different sites. The possibility of using *Calluna* as an indicator of site fertility is suggested. [Cf. *For. Abstr.* 11 (No. 904); 12 (No. 2722).]

2633. SHCHERBAKOV, A. P., and MISHUSTIN, E. N. Usloviya pitaniya kak sredstvo uskoreniya rosta seyantsev duba i razvitiya mikorizy na ego kornyakh. **[Nutritional conditions as a means of hastening the growth of Oak seedlings and the development of mycorrhizae on their roots.]** *Agrobiologiya* 1950 (5), (121–7). [Russ.russ.] [Institut Lesa Akademii Nauk S.S.S.R., and Institut Mikrobiologii, Moscow.] A.P.B.

Deals with fertilizer trials made in 1949 on grey forest soils in the Tellerman experimental forest, Voronezh Province. The fertilizers were dug in to a depth of not less than 20–25 cm., several days before sowing. Best results were given by applications of N, P_2O_5 and K_2O at respectively 20, 180 and 30 kg./ha. High P_2O_5 hastened germination of the acorns, increased the organic-matter content of the seedlings, improved root and mycorrhiza development and increased the soil-microflora population. Additional N, with P_2O_5 and K_2O held at a low level, retarded germination, decreased seedling growth, and reduced mycorrhizae and the soil microflora. Results are shown in tables and graphs.

2634. LAUDELOT, H. Étude pédologique d'un essai de fumure minérale de l'*Elaeis* à Yangambi. **[Pedological study of an experiment in applying mineral fertilizer to *E. guineensis* at Yangambi.]** *Publ. Inst. nat. Étude agron. Congo Belge* (*Sér. sci.*) No. 47, 1950. pp. 21. 21 refs. [F.f.e.]

The composition of the fertilizer used in this experiment (values in gram equivalents) was:—Ca 143, Mg 20, K 44, NO_3 44, PO_4 160, SO_4 42. The minerals were applied on 2 × 1-m. plots between the rows of Oil Palms at irregular intervals over a period of a year. Sampling was carried out 2 years after the 1st, and 1 year after the last dressing. The following results were observed:—(1) Total soluble salts increased sharply down to a depth of 60 cm. (2) The pH value of the soil had slightly increased in the surface horizons and markedly declined in the subsoil. (3) Total exchange capacity had increased strongly at all levels from 0 to 60 cm. (4) There was no change in total N content. (5) Some Ca and Mg had been fixed in the topsoil, but leaching had been appreciable. (6) No K had been fixed in a non-exchangeable form. Because of this and of the presence of Ca neutral salts, losses of K by leaching were severe. It is suggested that liming to increase the amount of adsorbed Ca when K salts and neutral Ca salts are applied simultaneously, would substantially reduce loss of K by leaching.

2635. COULTER, J. K. **Organic matter in Malayan soils: a preliminary study of the organic matter content in soils under virgin jungle, forest plantations and abandoned cultivated land.** *Malay. Forester* 13 (4), 1950 (189–202). 14 refs.

An outline of the generally accepted views on the nature and status of organic matter in the soil is given, and previous work, both in Malaya and elsewhere, on the function of organic matter and the degradation of tropical soils, is reviewed. The results of determinations of organic matter, N, and crumb stability of soils under virgin jungle, plantations, *lalang* (*Imperata* sp.) and *belukar* (secondary jungle) are tabulated and discussed. It was

shown that not all virgin-jungle soils are high in organic matter, nor all poor degraded soils necessarily low, and it is suggested that the determination of soil organic matter would not give a reliable measure of soil degradation. The average N content of virgin-jungle soils was found to be considerably higher than that of degraded soils, but again there are exceptions. Crumb stability was determined by the water-drop method and degraded soils were found generally to have low average values.

These results indicate that much of the degradation of tropical soils when exploited for dry-land annual crops may be due to physical rather than chemical factors. The higher temperature and loss of moisture resulting from clearing, and the breaking-up of the crumb structure by the direct action of heavy rain on the soil, must play a large part in leading to a condition in which crops can no longer profitably be grown. On the other hand, the question must be raised, how far *lalang* on the exploited area owes its widespread development to poverty of the soil and how far to its tremendous power of recuperation after fire. [Cf. *For. Abstr.* 11 (No. 2485).]

2636. [Dimbleby, G. W.] **[The reversion of podzols to a brown forest soil under Birch.]** *Rep. imp. For. Inst. Oxf. 1949–50*, 1951 (7–8).

It has been demonstrated that, on the North-east Yorkshire moors, the reversion of the podzol to a brown forest soil is a process occurring naturally under Birch. The crucial feature of this change is the contrast between the accumulation of organic matter as raw humus at the surface of the podzol and the intimate biological mixing of the humus with mineral soil in the brown forest soil, a mixing which cannot be effected by mechanical means, though these may assist the change, given the correct tree species. This change is of particular significance to the water-retaining capacity of the soil, which is a factor of great importance on these moors. Experiments are being made to test the possibilities of other hardwoods as soil-regenerating species.

2637. Duchaufour, P. La dégradation des sols sur les versants chauds dans les basses-Vosges. **[Soil degradation on the warm [southern] slopes of the lower Vosges.]** *Rev. for. franç.* 1951 (2), (103–9). 4 refs. [F.]

Soil degradation is frequent on the southern gravel slopes of the Vosges and is indicated by the formation of raw humus, an ericaceous ground flora, and regression of water-demanding species such as Fir and Beech. On S. and S.W. aspects the forest stands consist mainly of *Pinus sylvestris* of a good type, and on the S.E. of poor, badly formed *Quercus sessiliflora*. Treatment suggested includes the formation of mixed stands (Beech and Chestnut to be mixed with Pine at the lower, and *Q. borealis* at higher altitudes), and regeneration of Pine by clear felling.

11.48-9. Soil Types

See also *For. Abstr.* 12 (Nos. 2636, 2755, 2763).

2638. Guinier, P. Sols et forêts de l'Ouest: (pédologie, phytosociologie et sylviculture.) **[Soils and forests of the west [of France]: pedology, phytosociology, and silviculture.]** *Bull. Com. For., Paris* 14 (83), 1950 (1232–60). 11 refs. [F.]

Cf. *For. Abstr.* 11 (No. 2561).

2639. Richard, F. Böden auf sedimentären Mischgesteinen im schweizerischen Mittelland. **[Soils formed from mixed sedimentary deposits on the Swiss plateau.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 26 (2), 1950 (751–836 + 4 photos). 69 refs. [G.g.f.]

Presents the results of a study of several soil profiles, representing different degrees of soil evolution from certain sedimentary materials. The profiles selected for study were:—(*a*) a well developed brown soil, (*b*) stages preceding the formation of a brown soil, (*c*) a degraded brown soil.

2640. [Rennie, P. J.] **Physico-chemical properties of forest soils.** *Rep. imp. For. Inst. Oxf. 1949–50*, 1951 (9).

Chemical analysis of moorland soils from Allerston Forest, Yorks, has demonstrated the high concentration of nutrients in the surface peat, where Ca, P and K contents are respectively 10, 5, and 2 times as great as in the subsoil of lower calcareous grit. The leached layer is very deficient in nutrients. The nutrient content of the litter formed by Sitka Spruce planted on this soil is much higher where the trees are growing well than where growth is poor—the figures for Ca were respectively 9 mg./g. litter and 2 mg./g. litter.

2641. PEARSALL, W. H. **Ecology of wet soils in Britain.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. X.

The soil types distinguished and described are as follows:—(*a*) lake muds, (*b*) 'reducing' bog and fen peats, (*c*) *Molinia-Myrica* swamps, (*d*) Bogs with *Scirpus caespitosus* or *Eriophorum vaginatum*, (*e*) Alder, Willow and Pine woods.

2642. CHAPMAN, V. J., and RONALDSON. **Mangrove soils in New Zealand.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. X.

Some results of a study being made in the Auckland isthmus. The soils are of various types, depending on the relative proportions of sand and mud. The basic structure of swamps falls into 3 categories: (*a*) soft mud throughout, (*b*) mud overlying fresh-water peat, and (*c*) sand overlying mud. There are definite seasonal variations in the chemical constituents of the soil, and the soft Mangrove mud appears to differ from the other groups. Movement of the watertable is most pronounced in the sub-peat layer when present. The upper layers do not become waterlogged when the swamp is flooded by the tide. The swamps and marshes form behind mobile shell bars; rates of accretion have been measured and a tentative time scale established. [Cf. *For. Abstr.* 12 (No. 2651).]

11.6. *Hydrographical Conditions. Water and Soil Conservation*

See also *For. Abstr.* 12
(Nos. 2599, 2608, 2820, 2925–7, 3567).

2643. KEEN, B. A. **Minutes of meeting of Committee on Water Utilisation by vegetation.** *Open Session Paper, Conference on Hydrology and Water Resources, Nairobi* No. 4, 1950. pp. 4.

Cf. *For. Abstr.* 12 (No. 1737).

2644. BULLARD, W. E. **Some references on watershed management.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 63, 1950. pp. 26. 69 refs.

A brief survey of European and American studies, with some recommendations for the Pacific Northwest area.

2645. **Watershed management research. Coweeta Experimental Forest, Macon County, North Carolina.** Stheast. For. Exp. Sta. 1948. pp. 33 + 12. 34 refs.

Gives progress reports and results of investigations on the effect of agriculture and grazing on steep forest land, the effect of woodland grazing, the effect of ordinary logging practices on water [cf. *For. Abstr.* 10 (Nos. 893, 2428)], forest fires in relation to water, and the use of water by vegetation. [Cf. *For. Abstr.* 10 (Nos. 59–60).]

2646. HAASE, H. Die Folgen der Entwaldung des Harzes auf die Wasserführung und die Erosion. **[Effect of the deforestation of the Harz on the water régime and erosion.]** *Gas- und Wasserfach, München* 89 (9), 1948 (265–9). 5 refs. [G.] LD.U.

Includes graphs showing the comparative distribution of high-water run-off (1) in two streams of the Harz region (snow-melt in 1939 and thunderstorm in 1941) equally forested but situated at different levels, (2) in the same two streams (1948) when the catchment area of the lower one had been clear-felled to the extent of 31%, (3) in two Swiss areas (forested and non-forested). The 31% deforestation raised the high-water run-off of a stream with a 61/1,000 fall to a value corresponding to that of a river with a 104/1,000 fall.

2647. Numero speciale dedicato alla conservazione del suolo. **[Special number devoted to soil conservation.]** *Monti e Boschi* 1 (10/11), 1950 (437–528). [It.]

Contains a number of articles on soil conservation (erosion control, grazing, torrent training, dune fixation etc.) with particular reference to Italy.

2648. PURI, G. S. **The problem of land erosion and landslips in the Hoshiarpur Siwaliks.** *Indian For.* 75 (2), 1949 (1950), (45–51 + 2 dgms.). 39 refs.

Suggests that the formation of *chos* in these hills, although doubtless accelerated by overgrazing, deforestation, etc., is fundamentally due to geological formation. The strata dip from north to south, and rain falling on the (usually non-eroded) northern scarps percolates through to the southern dip slopes and causes erosion on them. More attention should be given to planting the scarp slopes with trees and other vegetation in order to reduce this percolation.

2649. CHEVALIER, A. La décadence des sols et de la végétation en Afrique Occidentale Française et la protection de la nature. **[The degradation of soils and vegetation in French West Africa and the protection of nature.]** *Bois For. Trop.* No. 16, 1950 (335–53). [F.e.span.]

Consists of an article and 5 notes, already published elsewhere, reviewing the subject and recommending immediate measures of control.

2650. DIJKMAN, M. J. ***Leucaena*—a promising soil-erosion-control plant.** *Econ. Bot.* 4 (4), 1950 (337–49). 77 refs.

This arborescent legume has long been used in Indonesia as a soil improver and stabilizer and as a shade plant. The wood is of little value, save as fuel and for high-quality charcoal. Some data are presented on the calorific value of the wood, annual fodder production per acre, amounts of N and P returned to the soil under a regular pruning system, climate and soil requirements, diseases, pests and methods of propagation. The author suggests that, since *Leucaena glauca* grows wild in Texas, Arizona and Florida, and *L. pulverulenta* in Texas and Arizona, it would be advantageous to use them there for soil conservation, horticultural purposes and pasturage. Numerous references to literature are given.

12. FOREST BOTANY. TREE SPECIES

12.1. *General Botany*

12.11. Physiology. Reproduction. Growth

See also *For. Abstr.* 12 (Nos. 2820, 3503–4).

12.11.1. *Plant Constituents. Metabolism. Photosynthesis. Translocation. Sap Flow. Transpiration. Growth Substances. Enzymes*

See also *For. Abstr.* 12 (Nos. 2610–1, 2616, 2626–8, 2643–5, 2688, 2838, 2889, 3017 *et seq.*, 3081, 3274–89, 3301–6, 3346).

2651. NAVALKAR, B. S., and BHARUCHA, F. R. **Studies in the ecology of the Mangroves. The hydrogen-ion concentration of the sea-water, soil-solution and the leaf cell-sap of the Mangroves.** *Journal of the University of Bombay, Bombay* (*n.s.*) 16*B* (5), 1948 (35–45). 12 refs. L.S.

A continuation of the study of Mangrove vegetation on Bombay and Salsette Islands [cf. *For. Abstr.* 5 (234)]. The results are presented of readings taken at frequent intervals throughout the year. The mean yearly values for the pH of the cell-sap of leaves of *Avicennia alba*, of soil solutions in H_2O and in KCl, and of sea-water, were 5·95, 6·85, 6·69 and 8·22 respectively. The mean values of the same solutions respectively during the monsoon are 6·05, 7·03, 6·71 and 8·24; during the cold season 5·88, 6·81, 6·71 and 8·23, and during the hot season 5·99, 6·67, 6·62 and 8·12. Seasonal climatic factors that affect the concentration of these substances are also responsible for the corresponding change in pH. [Cf. *For. Abstr.* 12 (No. 2642).]

2652. GORHAM, E. **Soil status and nutrient uptake by natural vegetation.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. X.

A study of plant/soil relationships in a wooded hillside catena in the English Lake District. In general, groups and species typical of the flushed sites along the lake shore accumulate more mineral matter and more excess base than those dominating the leached hillside. There is less Mn and Fe in plants from flushed sites and the reverse in those on leached sites. Mosses tend to absorb Fe selectively, while woody species usually concentrate on Mn.

2653. TAMM, C. O. **Growth and nutrient consumption in a forest moss community.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. X.

The annual nutrient consumption for a *Hylocomium proliferum* community was estimated at 1 ton of dry matter per ha. (about 10 kg. N, 1·5 kg. P and 5 kg. K). The sources of these substances and the relationship of such a community to the nutrient ecology of the forest is discussed. [Cf. *For. Abstr.* 9 (No. 67).]

2654. MONTFORT, C., and KRESS-RICHTER, I. Reversible photochemische Chlorophyllzerstörungen in besonnten Laubblättern von Aureaformen und ihre Beziehungen zu Strahlungsklima und Erbgut. **[Reversible**

photochemical destruction of chlorophyll in sun leaves of *aurea* forms of broad-leaved species and its relationship to insolation and heredity.] *Planta* 38 (4), 1950 (516–20). 9 refs. [G.] [Botanisches Institut der Universität Frankfurt a. M.] O.B.D.

2655. GIBBS, R. D. **Seasonal changes in water-contents of trees.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 2. X.

Presents patterns of change in water content throughout the year in wood of trees native to eastern Canada. [Cf. *For. Abstr.* 2 (17); 4 (154).]

2656. URSPRUNG, A., and BLUM, G. Über die Beteiligung der Kohäsion bei der Entstehung der Saugkraft in der Pinusnadel. [**The part played by cohesion in the production of suction force in *Pinus sylvestris* needles.**] *Verhandlungen der Naturforschenden Gesellschaft in Basel* 56 (2), 1945 (315–29). 25 refs. [G.] L.S.

2657. HOLMBERG, B. Zur Kenntnis des Frühjahrssafts der Birke. [**The spring sap of Birch.**] *Arkiv för Kemi, Mineralogi och Geologi, Stockholm,* 26*B* (15), 1948 (1–6). 10 refs. [G.] O.R.S.

The sugars in spring sap of *Betula verrucosa* were found to be almost exclusively glucose and fructose.

2658. HUBER, B., and ROUSCHAL, E. **Anatomical and physiological investigations on the sieve-tube system of trees.** *Transl. For. Prod. Aust.* 1950. pp. 6. *Transl.* by Dr. Chattaway & Dr. Feigl from *Berichte der Deutschen Botanischen Gesellschaft,* [*Berlin*], 56 (9), 1938 (380–91).

2659. GEURTEN, I. Untersuchungen über den Gaswechsel von Baumrinden. [**Investigations into gas exchange in the bark of trees.**] *Forstwiss. Cbl.* 69 (12), 1950 (704–43). 68 refs. [G.g.] [Forstbotanisches Institut der Forstlichen Forschungsanstalt, München.]

Describes experiments to investigate transpiration and respiration in the bark of the most important coniferous and hardwood species of Germany, and particularly in *Betula verrucosa.* The study covers fluctuations throughout the day, variations on different sides of the stem, influence of weather, and the part played by the lenticels. Results are presented in tables and graphs. In preliminary laboratory experiments, the diurnal loss of weight in bark separated from 3-in.-diameter twigs was calculated. The weight-loss/evaporation ratio was estimated to be 1 : 10. Simultaneous experiments with bark in which the lenticels had been covered over, showed a reduction in loss of weight. Field experiments demonstrated that 2 peaks of bark transpiration activity occur—at about 10.00 and 18.00 hrs. Differences in transpiration at different stem heights and differences after leaf-fall support the supposition that these fluctuations in activity are due to 'incipient drying', i.e. a falling of the water content of the bark cells during the warm part of the day. Remarkably high values were obtained for amounts of CO_2 given off. These are probably due to the sharp difference in atmospheric pressure for CO_2 within the tree and in the atmosphere. The proportion of the values for CO_2 given off to those for bark transpiration were between 1 : 2 and 1 : 5.

2660. EIDMANN, F. E. **Investigations on root respiration of 15 European tree species characterizing their pioneer quality in virgin soils.** *Proc. World For. Congr.* No. 3, 1950 (22–5). [E.]

A summary of the studies reported in the following abstract, but confined to the data on respiration.

2661. EIDMANN, F. E. Untersuchungen über die Wurzelatmung und Transpiration unserer Hauptholzarten. [**Studies on root respiration and transpiration of our principal forest tree species.**] *SchrReihe Akad. dtsch. Forstwiss.* 5, 1943. pp. vii + 144 + 12 photos. [G.g.]

The author was led to make the investigations here reported by observing root competition in Teak stands in Java. It was noticed that root competition varied considerably between different understorey species, and since neither nutrients nor water were limiting factors, it was concluded that the cause of the difference might be competition for O needed for root respiration. Accordingly, studies were made at Eberswalde in 1938–39 on 15 species (5 conifers and 10 broadleaved). The subjects were young plants (2–4 years old), kept under observation in hermetically sealed glass pots containing about 7 kg. of rich forest soil.

Water given off through transpiration was returned to the soil through a special U-tube.

The air in the soil was replaced 15 times a day by a pumping device, the air passing through the soil being led through an absorption tube containing NaOH for estimation of CO_2. In order to secure data on the share of the respiration of soil micro-organisms in this process, control pots containing the same soil but no plants were observed under identical conditions. Measurements were made daily, and at the end of the observations the absolute net weight of the roots and the leaves was ascertained. The apparatus is described in detail and illustrated.

The daily average of CO_2 given off by the roots during the vegetative period, expressed as mg.CO_2/g. dried weight of root, did not vary significantly between different plants of the same species, but there were great differences between species. The respective figures were as follows:—*Larix decidua* 63·4, *Pinus sylvestris* (East-Prussia provenance) 62·3, *P. sylvestris* (Rhineland provenance) 48·4, *Pseudotsuga taxifolia* 39·9, *Picea abies* 29·0, *Abies alba* 17·8, *Populus 'canadensis'* (adventitious roots) 381·8, *Betula verrucosa* 108·4, *P. tremula* 83·8, *Alnus glutinosa* 74·5, *Tilia parvifolia* 53·7, *Carpinus betulus* 43·6 *Acer platanoides* 30·8, *Fagus sylvatica* 30·3, *Q. robur* 26·6, and *Q. sessiliflora* 20·9. Disregarding the extreme data for the adventitious roots of *P. 'canadensis'*, the normal roots of many of these species show the highest respiration intensities known in the higher flora; they nearly approach the respiration activity of large mammals. On the basis of these data the author estimates that daily CO_2 production in g./sq. m. of soil area for tangled tree roots in densely stocked nursery beds, is 5 for feebly respiring and 15 for intensively respiring species. Daily CO_2 production of (micro-organisms in) the soil used for the experiments was 16 mg./kg. soil at 20° C. average daily temperature, and 6–8 g./sq. m. of soil area in the field.

Considering the amount of respiration in relation to growth (expressed as increase of dry weight), so as to get some idea of energy consumption per unit dry-weight production, the author divides his species into 4 groups:—(1) thrifty (the Oaks and Fir), (2) moderate (Alder, Beech, Lime, Hornbeam, and Norway Maple), (3) heavy (Larch, Spruce, Douglas Fir, Scots Pine (Rhineland) and Birch) and (4) extravagant (Aspen and Scots Pine (East Prussian)).

The influence of temperature on root respiration was studied and it was concluded that for the tree species under consideration a mean daily value of 20° C. was the optimum. Fluctuations in temperature caused fluctuations in respiration but did not significantly affect the relative respiration of the different species. In general, root respiration was found to increase during the summer months (April–August) and fall off in the autumn. But a noticeable fall occurs in June in most species. During the summer months, respiration of soil bacteria showed a continuous fall, irrespective of temperature, and rose again in the autumn.

The simultaneous measurements of transpiration showed a drop in intensity in June corresponding to the drop in intensity of root respiration. The tree series based on transpiration intensity is very little different from that based on root-respiration intensity, and the author therefore estimates the relative efficiency of the various species by comparing the production of dry weight with the energy consumption by respiration and water consumption by transpiration. By this rating, Alder, Pedunculate Oak, and Scots Pine (Rhineland) were the most, and Aspen, Birch, Scots Pine (East Prussian) and Douglas Fir the least efficient.

The possible bearing of these data on the choice of species for afforestation is discussed, but it is emphasized that field studies might give different results from these laboratory investigations.

2662. Pisek, A. Transpiration und Wasserhaushalt der Fichte bei zunehmender Luft- und Bodentrockenheit. [**Transpiration and water economy of Spruce in the presence of increasing dryness of air and soil.**] *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. [G.] X.

Observations during the dry summer of 1947 showed that, so long as the whole horizon occupied by the roots remains moist, transpiration is greater at the base of the crown than at the summit, for all exposures. When the ground begins to dry out, however, transpiration starts to slow down, on both the shady and sunny side of the crown and more markedly towards its base, i.e. the difference in transpiration rates disappears and finally becomes reversed. The tree reacts as a whole to a water

deficiency, and succeeds, by means of gradual economies, affecting mainly the less productive parts, in adjusting transpiration to moisture uptake.

2663. Étude de la transpiration du palmier à huile et des palmeraies. [**A study of the transpiration of single trees and of groves of Oil Palm** (*Elaeis guineensis*).] *Rapp. Inst. nat. Étude agron. Congo Belge 1948*, 1949 (21–4). [F.]

2664. Marques Mesa, A., Guzmán García, J., Cravioto, R. O., and Calvo de la Torre, J. Investigación de actividades antibióticas en extractos de plantas superiores. [**Study of the antibiotic properties of extracts of the higher plants.**] *Cienc. & Invest., B. Aires* 6 (10), 1950 (471–6). 12 refs. [Span.] [Instituto Nacional de Nutriología, Secretaría de Salubridad y Asistencia, México, D.F.] A.P.B.

Includes some tree species.

12.11.2. *Reproduction. Propagation. Growth. Development*

See also *For. Abstr.* 12 (Nos. 2661, 2684–5, 2693, 2843, 2992–6).

2665. Yunovidov, A. P. Nekotorye dannye o tsvetenii sosny. [**Some observations on the flowering of Scots Pine.**] *Lesn. Khoz.* 1950 (2), (71–3). 1 ref. [Russ.]

Discusses the distribution of ♂ and ♀ cones in Scots Pine on the basis of the author's observations in the Borovoe reserve, Kazakh S.S.R., where trees bearing cones of only one sex are rather frequent. Those bearing only ♂ cones are generally trees lagging in growth in closed stands: on one sample plot where 124 such trees were observed for 6 years, 119 were ♂ only and the other 5 did not flower at all. On bisexual trees in closed stands the ♀ cones are borne chiefly in the middle and upper crown, while the ♂ cones, though they may occur in various parts, are most abundant on the lower crown. The production of ♀ cones seems, therefore, to be associated with parts that have a relatively favourable environment and show the most vigorous growth and most intensive physiological processes. Of 4,522 22-year-old trees on a burn, 3,276 bore only ♀ cones, 1,235 did not flower, and only 11 had ♂ cones. Gal'pern's assertion [see *For. Abstr.* 11 (No. 883)] that ♂ branches cannot develop into ♀ ones, is refuted. Both experimentally and in observations on windthrown but still living trees it was found that better illumination could evoke the production of ♀ shoots on branches that had previously borne only ♂ cones.

2666. Panov, A. O fiziološkoj zrelosti bora kod nas. [**Physiological maturity of *Pinus* spp. in Jugoslavia.**] *Godišnj. biol. Inst., Sarajevo* 1 (1), 1948 (23–9). 9 refs. [Serb.russ.]

Concludes from 11 years' observation of stands in the vicinity of Banja Luka that in this region *Pinus sylvestris* and *P. nigra* attained true sexual maturity (i.e. capacity to bear viable seed) between 10 and 25 years of age, the latter species maturing some 3–4 years later than the former. Apparent maturity (i.e. flowering without producing viable seed) usually begins several years earlier, but where pollination by adjacent older stands occurs, the first ♀ cones to be produced may bear viable seed.

2667. Scaramuzzi, F. Il comportamento del sesso in *Rhamnus alaternus* L. [**Sexual behaviour in *R. alaternus*.**] *Nuovo G. bot. ital.* (*n.s.*) 56 (4), 1950 (718–20). 6 refs. [It.] A.P.B.

2668. Teuscher, H. ***Ginkgo biloba* from cuttings.** *Amer. Nurserym.* 93 (2), 1951 (7). [Montreal Botanical Garden.]

The male Ginkgo is well suited to street planting, but the female, which bears large, plum-like, evil-smelling fruit, is to be avoided. There is, however, no way of distinguishing the sex of young trees, which do not flower until at least 20–30 years old. Hitherto, attempts at vegetative propagation have failed. The present article describes a successful attempt to root cuttings taken from a 10-year-old Ginkgo. At the end of June a number of shoots were observed, sprung from a recent pruning wound. They were about 10 in. long, still soft at the tips, but beginning to harden basally. These were cut off as near the base as possible without injuring the old branch. The soft tips were removed, the bases dusted with Auxan, and the cuttings inserted about 3 in. deep into a 2 : 1 mixture of sharp sand and peat. Within 3 weeks they had all rooted. Hardly any callus had formed, the roots emerging from the thickened base typical of a Ginkgo twig. It is evidently essential to include this base in the cutting and also to leave a fair number of

leaves. The soft tips of the shoots, treated in the same way, all failed to root. The failure of previous attempts to obtain Ginkgo cuttings may have been due to use of the wrong kind of cutting, possibly from older trees, and at a different time of year.

2669. THOMAS, J. E., and RIKER, A. J. **Progress on rooting cuttings of White Pine.** *J. For.* 48 (7), 1950 (474–80). 20 refs.

From 50 to 90% of *Pinus strobus* cuttings taken from 3- or 4-year-old trees between mid-July and mid-September usually formed roots. Cuttings taken from older trees rooted with difficulty, the best result so far being 24% rooted. Young-tree cuttings, treated with indole-butyric acid, α-naphthaleneacetic acid, or 2,4-D, and placed in glass-covered and shaded beds, usually had a higher % with roots than the controls. Young grafts gave cuttings that rooted no better than those from older trees. Increasing the cut-surface area at the base of a cutting, or taking cuttings from the lower portion of a tree, both gave better results. Older-tree cuttings survived and rooted better when placed in open beds with intermittent spraying than in the covered, cold-frame type of bed; rooting of 15–20% was common after certain growth-substance treatments. Young-tree cuttings treated with growth substances, usually formed more roots per cutting than controls. Root pruning of rooted cuttings appeared necessary to stimulate a well branched root system. Rooted cuttings planted out as 2- to 3-year transplants were developing, after their first 6 seasons, a normal, upright type of growth indistinguishable from that of ordinary seedlings. *From authors' summary.*

2670. GUMPELMAYER, E. Die Bewurzelung von Stecklingen unter dem Einfluss von Heteroauxin im Jahresrythmus. [**Rooting of cuttings in the seasonal rhythm under the influence of heteroauxin.**] *Phyton, Horn* 1 (2/4), 1949 (154–69). 30 refs. [G.g.] [Botanisches Institut der Universität Innsbruck.] O.B.D.

The effects of various solutions of β-indole-acetic acid on rooting of cuttings of *Salix laurifolia, S. fragilis* and *Populus nigra* var. *italica* were observed. Rooting of both treated cuttings and controls showed a definite seasonal rythm. Two peaks were evident, the greater occurring in mid-summer, and a smaller one in winter or early spring. There was complete dormancy in October and relative dormancy in May. *S. fragilis* had an additional dormant period in February, and hence 3 peaks of activity. The number of roots formed, their diameter and the % of rooted cuttings were all increased by the action of heteroauxin; the % of rooted cuttings was most greatly increased by a concentration of 0·01%. With the *Salix* spp., stimulation of root formation in winter took place at the expense of bud development. The effects of heteroauxin can be increased after the autumn dormancy is passed and before full winter activity begins, and (in the case of *S. fragilis*) during the February dormant period, by immersing the cuttings in warm solutions of the growth substance (24 hours at 30° C.). After the times mentioned for the respective species the effects of such immersions are adverse.

2671. ROVSKI, V. M., and OZOLIN, G. P. Razmnozhenie il'movykh porod kornevymi cherenkami. [**Propagation of Ulmaceous species by root cuttings.**] *Lesn. Khoz.* 1950 (2), (89). [Russ.]

Experiments in 1946–48 showed that various Elms (*Ulmus densa, U. androssovi, U. scabra,* and *U. pinnato-ramosa*) can be successfully propagated by root cuttings in irrigated nurseries in Uzbekistan. With proper attention, even cuttings as thin as 0·3 cm. in diameter gave 90–100% survival, but larger ones are less likely to suffer from any irregularity in watering, and the recommended size is 10–12 cm. long and at least 0·5 cm. in diameter. The best planting time is March to early April. Cuttings should be planted more or less vertically, with their apices 1–2 cm. below the soil surface, and plenty of water must be supplied until they have rooted. Buds appear after 2–3 weeks and in the first season the shoots attain an average height of *ca.* 1 m.

The cuttings should be taken from healthy young plants; 2–3 root cuttings can be taken, without detriment to the plant, from a 1-year-old seedling, and if the seedling is used entirely for cuttings, 8–10 can be made. Transplants and plants raised from root cuttings yield more root cuttings, owing to their well developed root systems.

2672. HAGMAN, M. Metsäpuiden kasvullinen monistaminen. [**Vegetative propagation of forest trees.**] *Metsät. Aikak.* 1950 (7/8), (240–4). [Fi.e.]

Gives fairly detailed accounts of methods of vegetative propagation both by cuttings and by grafting. The advantages of outdoor grafting are explained. The best method is to carry out the primary grafting in the greenhouse, and then do secondary grafting out of doors on a large scale, using shoots from the primary graft as scions. The percentages of successful grafts to be expected in indoor grafting are *ca.* 80% for Pine, 40–50% for Spruce, and 60–70% for Birch and Larch.

2673. WELLS, J. S. **Pointers on propagation: grafting in the cold frame.** *Amer. Nurserym.* 93 (2), 1951 (12, 65).

2674. ZARUBIN, A. K voprosu poroslevogo vozobnovleniya gretskogo orekha. [**Propagation of *Juglans regia* by layering coppice shoots.**] *Lesn. Khoz.* 1950 (2), (46–7). [Russ.]

Though there is practically no regeneration from seed in the natural Walnut forests of the Southern Kirghiz S.S.R., Walnut coppices vigorously, and a method [no details are given] has been developed of vegetative propagation by layering 1- to 2-year-old coppice shoots. The plants derived from layers grow much quicker than seedlings, reaching 3 m. in height at 3 years old, when 43% of them develop their first fruit. It is suggested that by grafting on to coppice shoots and then layering, it would be possible to produce self-rooted stock of improved (e.g. hybrid) strains.

2675. YURKEVICH, I. D. Kak prizemlyat' stebli bereskleta. [**How to earth up *Euonymus* stems.**] *Lesn. Khoz.* 1950 (2), (84–5). [Russ.]

Experiments have shown that stem bark of *Euonymus verrucosus* and *E. europaeus* will develop the same gutta-percha content as that of the root bark if stems over 10 mm. in diameter are pegged down and covered with earth for 7–8 years. This can be done in either natural stands or plantations. Bushes with long, thick stems should be selected. After earthing up (5–10 cm., or in dry regions 10–15 cm.) the area must be protected until ready for harvesting. When the crop is lifted the rooted tips of the layered branches are not lifted but cut off *in situ* to form a new crop, together with any stems not exceeding 10 mm. in diam. Mixing of stem and root bark, and of bark from layered and non-layered stems, is not permitted.

2676. SKVORTSOV, A. K. O vegetativnom razmnozhenii eli. [**Vegetative reproduction [i.e. natural layering] of Norway Spruce.**] *Priroda, Moskva* 37 (10), 1948 (73–4). 4 refs. [Russ.] A.P.B.

In a very open Norway Spruce stand in the Moscow region the persistent lower branches of many trees, though often bent by their own weight so that they crept along the ground and were covered by moss and grass roots, layered comparatively rarely, only 20 cases of layering being found on an area of 6 ha. The roots, when formed, always grew obliquely towards the rooted parent tree, the rooted portion of the branch thickened considerably, and although a secondary branch would develop into an erect stem, the main branch often continued to grow horizontally at the same time.

2677. BOYD, J. D. **Tree growth stresses. I. Growth stress evaluation.** *Aust. J. sci. Res.* 3*B* (3), 1950 (270–93 + 4 photos). 6 refs. P.R.

Experimental methods for the determination of natural longitudinal stresses in trees are described and the data are used in the development of a mathematical expression for the stress distribution. Transverse stresses naturally existing within the tree are similarly investigated and the results analysed mathematically. Another significant class of stresses is shown to result directly from the felling or cross-cutting of a tree. *Author's summary.*

2678. BOYD, J. D. **Tree growth stresses. III. The origin of growth stresses.** *Aust. J. sci. Res.* 3*B* (3), 1950 (294–309 + 1 photo). 20 refs. P.R.

Available evidence indicates that growth stresses originate in newly differentiated cells towards the periphery of a tree. It is considered that an origin connected with the structural development of peripheral cells would explain both the longitudinal and lateral distribution of growth-stress effects more satisfactorily than other hypotheses suggested. The cause of growth-stress development may be explained by the theory that cells tend to shorten in length, and simultaneously to increase in cross-section during or immediately after differentiation. The resistance of the mature cells throughout the tree to such a shortening could induce the stress effects which occur. *From author's summary.*

12.11.3. *Heredity. Breeding. Hybridization. Races and Questions of Provenance. Cytology*

See also *For. Abstr.* 12 (Nos. 2571, 2706, 2830, 2843–4, 3301–2, 3385, 3459–60).

2679. LARSEN, C. S. **Tree displays.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 2. X.

Puts forward the advantages of tree displays (i.e. a collection of planted groups of trees where each group represents a clone) in estimating the merits of a genotype. X.

2680. RIKER, A. J. **Developing disease resistance in trees.** *Amer. Nurserym.* 93 (2), 1951 (9, 70–4).

A review of progress in tree breeding for disease resistance in U.S.A.

2681. HEIMBURGER, C. **The breeding of White Pine (*Pinus strobus*) in Canada.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. X.

Summarizes Canadian work in the breeding of disease-resistant biotypes. Good success has been obtained with grafting on to *Pinus sylvestris* and *P. banksiana*. Partial girdling has been found to stimulate flowering in stands of polewood size, and crosses with related species are being studied. There is evidence of a high degree of resistance to blister rust (*Cronartium ribicola*) in some populations, but no resistance to weevil (*Pissodes strobi*) attack has yet been found. [Cf. *For. Abstr.* 10 (No. 2457–8).]

2682. CHAMPION, H. G. **Tree breeding and seed supplies in north-west America with special reference to Douglas Fir (*Pseudotsuga taxifolia* Brit.).** *Forestry* 23 (2), 1950 (69–77). 3 refs.

The developments in tree breeding and select seed supplies on the Pacific coast of North America are reviewed briefly. Particularly valuable work on Douglas Fir has been done since 1912 in Oregon at the Pacific Northwest Forest Experiment Station, Wind River. Valuable work also is being done at the Institute of Forest Genetics, Placerville, N. California, mainly on the genus *Pinus*; and in their few Douglas Fir stocks the author noted apparent marked differences in susceptibility to *Adelges cooleyi*, which, however, seems to do little harm to Douglas Fir in its natural home.

There is evidence that there are important differences in the value of Douglas Fir seed from specific stands or trees inside any one climatic zone, but at present it is not practicable to procure élite seed in quantity. For research purposes limited amounts may be obtainable by special arrangements.

The work on *Pinus* at Placerville is producing very promising fertile hybrids with increased vigour and resistance to insects. Their timber quality and frost resistance have still to be determined. Controlled pollination by the use of bags is proving effective at 25 bags per man-day, yielding 500 or more hybrid plants. These can be tested by interplanting with ordinary stock, and leaving or removing the hybrids in thinnings, on their merits. Thus $2\frac{1}{2}$ acres of diluted planting can be tried per man-day of bag-work. The possible increase in volume production is up to 200%, compared with, perhaps 25% by the use of élite natural races. A co-operative experiment in the latter technique is suggested, between the U.S. Pacific Northwest Forest Experiment Station, the British Columbia Forest Service, and the Forestry Commission of Great Britain. *From author's summary.*

2683. **[Breeding exotic Pines in S. Queensland.]** *Rep. Qd. For. Serv. 1949–50*, 1950 (7).

The oldest plots resulting from controlled pollination are now 7 years old and the progeny resulting from selfing is of particular interest. Plants originating from any one selfing are uniform in development and characteristics, and characters such as size and angle of branches and number of whorls per unit length of stem can be correlated with those of the parent tree. It is therefore proposed to examine critically the progeny of each of the parent trees to determine which have transmitted desirable form characteristics and to concentrate work on the selfing of these trees. The progeny from this selfing will be reared in plots well away from established trees of the same species.

2684. CARPENTER, I. W., and GUARD, A. T. **Some effects of cross-pollination on seed production and hybrid vigor of Tuliptree.** *J. For.* 48 (12), 1950 (852–5). 7 refs.

Cross pollination gave 90% filled seed per cone compared with 34·8% for open pollination. Self pollination greatly reduced the % of filled seed and in some cases produced complete sterility. Stratification for 90 days in moist river sand at temperatures of 36–40° F. was entirely satisfactory. Seedlings produced as a result of crossing showed marked heterosis and the more distant the source of pollen from the mother tree, the greater was the increase in vigour. The methods of transporting pollen (on the anthers of half-opened flowers) and effecting artificial pollination are described.

2685. NIELSON, P. C. **Experiments with controlled pollination within the genus *Fagus*.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. X.

In experiments at the Danish Royal Veterinary and Agricultural College, self pollination of 1,432 ♀ flowers on 5 *Fagus sylvatica* trees resulted in 2 full and 487 barren nuts, while open pollination gave 25–45% fully developed nuts. It seems likely that *F. sylvatica* is self sterile, or, at least, that self pollination takes place very rarely. In crossings of *F. sylvatica* with *F. orientalis* 1,026 nuts with, and 361 without kernels were obtained.

2686. BASBOUS, M. Les hybrides américains de peuplier. [**American hybrid Poplars.**] *Schweiz. Z. Forstw.* 101 (9), 1950 (418–37). 39 refs. [F.g.]

Mainly an account of the Stout and Schreiner hybrid clones [cf. *For. Abstr.* 10 (No. 2466)]; methods of breeding, silviculture, increment, and cellulose content. The data include d.b.h. and total height of trees, cellulose and lignin content (*a*) at base, (*b*) at breast height and (*c*) at top of tree, specific gravity, and shrinkage of wood, for 18 clones at ages ranging from 7 to 12 years.

2687. ANDERSSON, E., and STRAND, L. Några data från två jämförande försöksodlingar med asp. [**Data from two comparative breeding experiments with Aspen.**] *Svensk PappTidn.* 54 (3), 1951 (81–92). 3 refs. [Sw.E.] (*Medd. Fören. Växtförädl. Skogsträd* No. 54.) P.R.

Observations have been made at the nurseries at Brunsberg over the period 1942–49 on growth variations between *P. tremula*, *P. tremuloides* × *P. tremula* and *P. alba* × *P. tremula*. All the plants used in the experiments were derived from controlled crosses carried out in greenhouses. Most of the parent trees were plus trees. The 1-year-old plants were put out in 1942 on cultivated clay soil, according to Fisher's block method with 3 replications; each plot contained 50 trees planted in 2 rows at 1·2 × 1·2 m. spacing. The first row in each plot was cut back after planting out in 1942, and the 2nd in the following spring. Results of measurements carried out through the period are tabulated. The hybrid Aspen (*P. tremuloides* × *P. tremula*) has so far proved superior in growth to the *P. tremula* progenies and to the *P. alba* × *P. tremula* hybrid. Mean heights and diameters for the hybrid Aspen are:—in experiment A, 551 and 4·78 cm., and in experiment B, 511 and 3·76 cm.; the corresponding figures for the *P. tremula* progenies in experiment A are 286 and 1·75 cm. and in experiment B for the *P. tremula* and the *P. alba* hybrid taken together 277 and 1·55 cm. No continuous statistically significant differences in growth between the pure *tremula* progenies were demonstrated by the experiment. One of the average crosses was inferior in quality to the plus crosses, having more crooked stems, thicker branches, more branches per m. of stem, and more acute branch angles. Cutting back immediately after planting gave rather better results than cutting back in the following year, but the height differences between the rows tended to disappear towards the end of the period. The *P. alba* hybrid was more severely attacked by *Cytospora chrysosperma* than either the pure or the hybrid Aspen. The hybrid Aspen has so far resisted attack by *Fusicladium radiosum* and *Melampsora tremulae*. This resistance contributes to a late leaf-fall, and thus to a longer period of vegetation. The hybrid Aspen has so far proved inferior in quality of branch and stem shape to plus crosses of *P. tremula*; it has also proved to be slightly more susceptible, where the stem has been damaged, to *Nectria galligena*.

2688. GROSZMANN, H. M., KELENYI, G. P., and RODWELL, C. N. **Hybrids between *Duboisia myoporoides* and *D. leichhardtii*.** *Qd. J. agric. Sci.* 6 (3), 1949 (196–203). 2 refs. O.R.E.

A cross was made between the two species, which were induced to flower by treating with an aqueous solution of acetylene. Some of the

morphological and physical characters of the F_1 generation are described. The hybrid seems to be more frost-resistant than *D. myoporoides* and to survive waterlogging better than *D. leichhardtii*. Quantity and types of alkaloid in the F_1 generation varied from tree to tree, but the tendency of the hybrid was to yield greater quantities of alkaloid than the parent trees.

2689. EBES, K. Verbetering van de stamvorm door selectie. **[Improvement of stem form by selection.]** *Ned. Boschb.-Tijdschr.* 23 (1), 1951 (1–7). 3 refs. [Du.e.]

A discussion, with photographs, of improvement in stem form of *Cinchona ledgeriana* in Java by selective breeding for increased yields of quinine, using selected seed and vegetative propagation. An improved stem form is found in the first generation and it is suggested that similar results could rapidly be obtained with other tree species.

2690. FISCHER, F. Die Jugendentwicklung von Lärchen verschiedener Herkunft auf verschiedenen Standorten. **[The early development of Larch of different provenances on different sites.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 26 (2), 1950 (469–97). 55 refs. [G.g.f.]

It is concluded that the markedly superior performance of Larch of Sudeten origin compared with Alpine races, in provenance trials in Switzerland, is largely due to its much faster development in early youth; it often forms a closed canopy at 3 or 4 years old, long before Alpine Larch at the same spacing.

The recent series of drought years has disclosed differences of drought resistance in Larch of different provenances. Amongst the Alpine Larches, those from the higher altitudes are more drought-resistant than those from the lower. Height growth of Sudeten Larch was noticeably reduced by drought, though it still remained superior to that of other provenances. The only sample plot of Japanese Larch [*L. leptolepis*] examined, had been killed by the drought of 1947.

Analysis of growth data showed that the first half of the annual height increment of Sudeten Larch depends on the maximum temperature, and the second half (mid-July to the end of the vegetative period) on the abundance of rainfall in the first part of the vegetative period.

2691. HEIKINHEIMO, O. Tuloksia kuusen ja männyn maantieteellisillä roduilla suoritetuista kokeista. **[Results of provenance trials of Spruce and Pine in Finland.]** *Commun. Inst. for. Fenn.* 37 (2), 1949 pp. 44. 10 refs. [Fi.e.]

Most of the plants used in these trials were raised from seed in 1926. The Spruce came from several parts of Finland, Norway, Germany, Switzerland, several parts of the U.S.S.R. (Carpathian Ruthenia, Esthonia, and Latvia), and Hungary; the Pine from several parts of Finland, U.S.S.R., Norway and Hungary. Experimental plantations were made at a number of sites of varying altitudes and latitudes. A general feature of several of the Spruce plantations is the greater mean and maximum heights for seed of local or more southern origin compared with that from provenances north of the plantation site. Northern races have suffered proportionately more than southern in spring frosts, and southern races more than northern from autumn and winter frosts. The Esthonian races gave the best all-round results. The trials of Pine were less extensive, but gave much the same results. It appears, however, that the northern races are the more resistant to *Lophodermium pinastri*.

A study was made of the effect of grading of nursery stock on the results of Spruce provenance trials. Large, medium, and small plants respectively were selected in the nursery; these comprised both older and younger plants and both transplanted and untransplanted. The stands originating from the different assortments now differ from each other considerably, those from the large plants averaging *ca.* 30% larger and those from the small plants about 20–30% smaller than those from medium-sized plants. The results were less striking with Pine.

In general it is concluded that the transfer of seed from north to south produces a slower-growing stand than indigenous seed; in any case the distance should be limited, preferably not exceeding 100–150 km. (60–90 miles). Transfer of seed from south to north seems practicable for Pine, but care is needed and in any case distances over 200 km. (120 miles) are not advised. In S. and Central Finland, transfer of Spruce seed from south to north is possible and even advantageous over a distance of 200–300 km. (120–180 miles). Transfer of

seed from east to west and *vice versa* seems to have no noticeable effect.

2692. SCHULENBURG, A. F. V. D. **Questions of provenance with relation to pulpwood.** *Pap. ja Puu* 32*B* (12), 1950 (387–92). 4 refs. [E.e.]

Spruce from mountain areas in Central Germany grows more rapidly than local Spruce in northern Europe but is subject to late spring frosts. Trees from a lowland area in Niederlausitz were of excellent quality and resistant to frost. Both this reserve area and new plantations in Germany were destroyed during the war, but trees grown from seed at the Danish State Forest Experimental Station have survived. Silvicultural experiments with Lodgepole Pine (*P. contorta* var. *latifolia*) in S. Finland are described. [Cf. *For. Abstr* 11 (No. 2621).]

2693. DAUBENMIRE, R. F. **A comparison of season of cambial growth in different geographic races of *Pinus ponderosa*.** *Bot. Gaz.* 112 (2), 1950 (182–8). 7 refs. O.B.D.

Studies of cambial activity were made with dial-gauge dendrometers on *Pinus ponderosa* and *P. ponderosa* var. *scopulorum* in the Priest River Experimental Forest, where plantations of trees from 22 different localities were established between 1911 and 1917. The average dates that saw 5%, 50% and 95% of the season's radial growth completed were 23 May, 21 June and 22 August respectively. Although considerable variation in growing seasons occurred among individuals of the same provenance, there was a striking similarity in periods of radial growth among populations originating in widely different climates and latitudes. No correlation was found between susceptibility to frost and a continuance of radial growth late into the season, or between length of daylight and growing season. No grouping of the populations into races based on morphology and anatomy with relation to cambial activity proved possible.

2694. MIKI, S., and HIKITA, S. **Probable chromosome number of fossil *Sequoia* and *Metasequoia* found in Japan.** *Science* 113 (2923), 1951 (3–4). 5 refs.

The close similarity between both the guard and epidermal cells of the fossil remains of *Sequoia* and *Metasequoia* and the corresponding cells of living plants of the same genera is strong circumstantial evidence that the fossil *Sequoia* of Japan, like the living *S. sempervirens* of California, had the chromosome number $2n = 66$, while the fossil *M. japonica* had the chromosome number $2n = 22$. [Cf. *For. Abstr.* 10 (No. 2459).]

2695. KIELLANDER, C. L. **Induced and natural polyploidy in *Picea abies* (L.) Karst.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 2. X.

In 1945–46 at the Ekebo Forest Tree Breeding Institute 93 aberrants were discovered among 1,200,000 seedlings, originating from a batch of seed collected from about 500 trees. Of these, 49 were diploid ($2n = 24$), 1 was triploid ($2n = 36$), 22 were tetraploid ($2n = 48$), and 3 were mixoploid. These natural polyploids do not differ materially from C_o plants of the same age; they have the same poor growth and would not survive in plantations or dense natural repopulations. It appears that deviations from the normal chromosome number often result in different morphological types, and that triploid and tetraploid Spruce races are more slow-growing than diploids. In *Picea abies* $2n = 24$ represents the optimum. [Cf. *For. Abstr.* 6 (218–9).]

2696. ATCHISON, E. **Chromosome numbers among tropical woody Leguminosae.** *Abstr.* in *Journal of the Tennessee Academy of Science, Nashville* 25 (3), 1950 (221). (*Proceedings of the Eleventh Annual Meeting of the Association of Southeastern Biologists.*) L.S.

2697. BALDWIN, J. T. JR., and SPEESE, B. M. ***Aeglopsis chevalieri* in Liberia.** *Bull. Torrey bot. Cl.* 77 (5), 1950 (368–71). 7 refs. O.B.D.

Reports a collection of *A. chevalieri* from the hinterland of Liberia, from which seedlings have been raised. A $2n$ number of 18 was determined. The material shows that *A. chevalieri* has very close affinities with *A. eggelingii*. *From authors' summary.*

2698. SARVAS, R. Jättiläishaapa Helsingin kaupungissa. [**A giant Aspen in Helsinki.**] *Metsät. Aikak.* 1950 (3/4), (98–100). 7 refs. [Fi.e.]

Discovered by the author in June 1948 at the Käpylä School, this Aspen [*Populus tremula*] belongs to a clone of 9 stems, in which the largest is 11 years old and 11·2 m. high. The leaves are abnormally large and pollen samples

very heterogeneous. Cytological investigation shows this to be triploid, with $3x = 57$.

12.13. Embryology

2699. Swamy, B. G. L. **A contribution to the life history of *Casuarina*.** *Proceedings of the American Academy of Arts and Sciences, Boston* 77 (1), 1948 (3–32 + 7 plates). 35 refs. L.S.

A study of the embryology of *Casuarina equisetifolia* and *C. montana* and a comparison with other *Casuarina* species, with a brief survey of other chalazogamous plants.

2700. Rao, C. V. **Contributions to the embryology of Sterculiaceae—II. *Waltheria indica* Linn.** *J. Indian bot. Soc.* 29 (3), 1950 (163–76). 13 refs. O.B.D.

12.14. Organography. Morphology. Anatomy. Histology

See also *For. Abstr.* 12 (No. 2658).

2701. Clowes, F. A. L. **Root apical meristems of *Fagus sylvatica*..** *New Phytol.* 49 (2), 1950 (248–68 + 4 photos). 19 refs. O.R.S.

2702. Carlson, M. C. **Nodal adventitious roots in Willow stems of different ages.** *Amer. J. Bot.* 37 (7), 1950 (555–61). 10 refs. O.B.D.

2703. Johnson, M. A. **Growth and development of the shoot of *Gnetum gnemon* L. I. The shoot apex and pith.** *Bull. Torrey bot. Cl.* 77 (5), 1950 (354–67). 48 refs. O.B.D.

2704. Morley, T. **On leaf arrangement in *Metasequoia glyptostroboides*.** *Proceedings, National Academy of Sciences, Washington* 34, 1948 (574–8). 2 refs. O.R.S.

2705. Rao, T. A. **Foliar sclereids in the Oleaceae. 1. On the occurrence of sac-like spicular cells in the leaf of *Schrebera swietenioides* Roxb.** *J. Indian bot. Soc.* 28 (4), 1949 (251–4). 9 refs. O.B.D.

2706. Bosch, E. Blütenmorphologische und zytologische Untersuchungen an Palmen. **[A study of flower morphology and cytology in Palms.]** *Berichte der schweizerischen botanischen Gesellschaft, Bern* 57, 1947 (37–100). 23 refs. [G.f.] L.S.

2707. Rao, C. V. **Floral anatomy of some Sterculiaceae with special reference to the position of stamens.** *J. Indian bot. Soc.* 28 (4), 1950 (238–44). 1 ref. O.B.D.

2708. Campo-Duplan, M. van. Recherches sur la phylogénie des Abiétinées d'après leurs grains de pollen. **[Researches into the phylogeny of the Abietineae as displayed in their pollen grains.]** *Trav. Lab. for. Toulouse* 2 (4) Art. 1, 1950. pp. 183. 112 refs. [F.]

Part 1 (50 pp.) gives a general account of pollen morphology and development. Part 2 gives detailed accounts of the pollen morphology of the Abietineae and some other coniferous genera (100 pp.) followed by a short discussion of the possible bearing of these data upon the question of the development of some coniferous genera. [Cf. *For. Abstr.* 12 (Nos. 978–82).]

2709. Lüdi, W. Beitrag zur Kenntnis der *Salix* und *Artemisia*-pollen. **[Contribution to the knowledge of *Salix* and *Artemisia* pollen.]** *Bericht über das Geobotanische Forschungsinstitut Rübel in Zürich für das Jahr 1949*, 1950 (101–9). [G.]

A morphological study.

2710. Youngken, H. W., and Simonian, V. H. **A study of the seeds of *Strophanthus sarmentosus* and some related species of *Strophanthus*.** *J. Amer. pharm. Ass. (sci. Ed.)* 39 (11), 1950 (615–20). 11 refs. O.R.S. [Cf. *For. Abstr.* 12 (Nos. 2783, 3273).]

2711. Allegri, A. Fotografie di corteccia. **[Photographs of bark.]** *Monti e Boschi* 2 (1), 1951 (38–9). [It.]

Notes on the best methods of photographing the bark of standing trees for purposes of identification, botanical description etc.

12.19. Geographical Distribution. Plant Geography and Sociology

See also *For. Abstr.* 12
(Nos. 2576, 2585, 2781, 2799, 2820, 2822, 2824, 2826).

2712. Dansereau, P. **Flora and vegetation of the Gaspé peninsula.** *Repr.* from *Wild Flower* April, 1950 (26–40 + 9 plates). 21 refs. [E.]

2713. OFFNER, J., and BREISTROFFER, M. Sur la répartition géographique du *Juniperus thurifera* L. **[The geographical distribution of *J. thurifera*.]** *Bulletin de la Société Scientifique du Dauphiné, Grenoble* 63, 1948 (6–8). [F.] *Abstr.* in *Bull. Soc. bot. France* 95 (5/6), 1948 (223). O.B.D.

2714. TSCHERMAK, L. Die Eibe im städtischen Forstamt Neusohl, Slowakei, das grösste der bisher bekannten Eibenvorkommen in Europa. **[Yew in the municipal forest of Neusohl, Slovakia, the largest known stand of *Taxus baccata* in Europe.]** *Forstwiss. Cbl.* 68 (1), 1949 (4). [G.]

Notes on the Yew, growing in mixture with Beech, Fir and Spruce, and on its habitat.

2715. FUKAREK, P. Podaci o geografskom raširenju munike (*Pinus heldreichii* Christ.). **[The geographical distribution of *P. heldreichii*.]** *Godišnj. biol. Inst., Sarajevo* 2 (1/2), 1949 (1950), (21–41). 87 refs. [Croat.g. russ.]

2716. FUKAREK, P. Podaci o raširenju molike (*Pinus peuce* Grisebach) na Balkanskom Poluostrvu. **[The natural distribution of *P. peuce* in the Balkan Peninsula.]** *Godišnj. biol. Inst., Sarajevo* 2 (1/2), 1949 (1950), (43–52). 30 refs. [Croat.g.russ.]

Lists the known localities of this species and concludes that Dimitrov's records from Bosnia and Herzegovina are probably erroneous.

2717. FUKAREK, P. Podaci o raširenju planinskog javora (*Acer heldreichii* Boiss.) u Bosni, Hercegovini i susjednim krajevima. **[The natural distribution of *A. heldreichii* in Bosnia, Herzegovina and the neighbouring regions.]** *Godišnj. biol. Inst., Sarajevo* 1 (1), 1948 (31–40). 49 refs. [Croat.]

2718. JOVANOVIĆ, B. Neka zapažanja o brezi i jeli u našim šumama. **[Some observations on Birch and Silver Fir in our forests.]** *Glasn. šum. Fak., Beograd* No. 1, 1950 (153–8 + 5 photos). 14 refs. [Serb.f.]

Betula verrucosa is found over an extensive area of the country, while *B. pubescens* is confined to a few districts. Morphological and ecological studies on Birch in eastern Serbia suggest that hybrids between the 2 species are also present. *Abies alba*, which was increasing in the Suva Planina at the beginning of the century, had almost disappeared by 1949. Its presence in the local Beech forests is important in phytosociological classification.

2719. FUKAREK, P. Raširenje poljskog ili lučkog jasena (*Fraxinus oxycarpa* Willdenow) u F. N. R. Jugoslaviji. (Prethodni izvještaj.) **[Natural distribution of *F. oxycarpa* in Jugoslavia. (Preliminary report).]** *Godišnj. biol. Inst., Sarajevo* 1 (2), 1948 (1949), (63–70). 29 refs. [Croat.russ.]

2720. VOEGELI, H. Untersuchung über die Verteilung von Stiel- und Traubeneichen in den Wäldern des Niederterrassengebietes von Rheinau und Ellikon am Rhein. **[The distribution of Pedunculate and Sessile Oaks on the lower terraces between Rheinau and Ellikon am Rhein.]** *Schweiz. Z. Forstw.* 102 (1), 1951 (52–61). [G.f.]

On the whole, the proportion of Sessile Oak was greatest on the upper terraces and diminished progressively on the lower ones. This is believed to be because of its greater susceptibility to frost injury in youth. [Cf. *For. Abstr.* 12 (No. 3340).]

2721. GUTZWILLER, R. Beobachtungen über das Vorkommen von Weiden (*Salices*) in schweizerischen Flyschgebieten. **[The occurrence of *Salix* spp. on Swiss flysch areas.]** *Schweiz. Z. Forstw.* 101 (12), 1950 (656–61 + 2 plates). 7 refs. [G.]

2722. [GIMINGHAM, C.] **[Ecology of *Calluna*.]** *Abstr.* in *J. Anim. Ecol.* 19 (2), 1950 (204–5).

Summary of a paper read to the British Ecological Society 22.10.50. [Cf. *For. Abstr.* 12 (No. 2632).]

2723. PETTERSSON, B. **An experimental investigation of the dispersal of mainly anemochorous nordic phanerogams.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 2. X.

Floating capacity in air and buoyancy in water were determined for the diaspores of a number of species, including *Salix caprea* and *Populus tremula*.

2724. ASTON, B. C. **The Puka (*Meryta sinclairii*).** *Forest and Bird, Wellington* No. 97, 1950 (12–4). B.A.P.

Observations on *M. sinclairii* growing on the Three Kings Islands, 40 miles north-west from Cape Maria Van Diemen. It is only here and

on the Hen and Chickens Islands (Taranga) off the entrance to Whangarei Harbour that the New Zealand species of *Meryta* is found. On South West Island gulls were noticed feeding on the Puka fruit, and it seems probable that gulls are instrumental in disseminating the species.

12.19.1. *Regional Floras, including Check Lists*

2725. JACQUES-FELIX, H. Les flores d'Afrique tropicale: 1. Contributions françaises et belges. 2. Contributions britanniques. 3. Contributions allemandes, portugaises, espagnoles. **[Floras of tropical Africa: 1. French and Belgian. 2. British. 3. German, Portuguese and Spanish.]** *Agron. trop.* 5 (3/4; 7/8; 11/12), 1950 (190–2; 412–3; 645–6). 73 refs. [F.]

An annotated bibliography.

2726. LITTLE, E. L. JR. **Southwestern trees: a guide to the native species of New Mexico and Arizona.** *Agric. Handb. U.S. Dep. Agric.* No. 9, 1950. pp. 109. 31 refs.

2727. PULLE, A. [Editor]. **Flora of Suriname (Netherlands Guiana). Vol. 3, part 2. (49–256). Oxalidaceae (pars)—Myrtaceae — Aquifoliaceae — Dichapetalaceae — Trigoniaceae — Vochysiaceae — Zygophyllaceae — Burseraceae — Umbelliferae.** *Meded. ind. Inst. Amst.* No. 30 (*Afd. trop. Prod.* No. 11), 1951. [E.] Price *Fl.*13.

[Cf. *For. Abstr.* 10 (No. 933).]

2728. HILDEBRAND, F. H. Verbeterde boomnamenlijst van Celebes. **[Revised list of tree species from Celebes.]** *Rapp. Bosbouwproefsta., Bogor* No. 43, 1950. pp. 105. [Jav.Du.E.]

A check list arranged (1) alphabetically by vernacular names, showing the durability class of each timber, and (2) by family, genus and species. A list showing the equivalent Celebes name for Indonesian vernacular names of species is also given.

12.19.2-3. *Vegetation Types*

See also *For. Abstr.* 12 (Nos. 2605, 2638, 2641–2, 2652–3, 2820, 2838, 2852, 3528).

2729. [CAJANDER, A. K.] **Aimo Kaarlo Cajander in memoriam.** *Acta for. fenn.* No. 56, 1949. pp. 7 + 15 + 40 + 71. [Fi.E.]

This memorial volume contains: (1) an appreciation of Cajander, (2) a bibliography of his published writings, and (3) a reprint and English translation of his paper on forest types and their significance, first published in 1926–30.

2730. WRABER, M. O pomenu fitosociologije za gozdarstvo. **[The importance of phytosociology in forestry.]** *Gozd. Vestn.* 8 (2), 1950 (40–6). [Sloven.croat.f.]

2731. BEADLE, N. C. W. **Problems in identifying the climax vegetation.** *J. Ecol.* 38 (2), 1950 (412).

Résumé of a paper read at a meeting of the British Ecological Society 30 March 1950. The speaker dealt with the difficulty of fitting Australian vegetation into Clement's monoclimax system. Maps of Australia based on the theory were seriously misleading. A further weakness of the monoclimax theory was its tendency to overlook the great differences that might arise if an alternative set of species were available. Species of *Eucalyptus* could colonize grassland in California, so that if they had been natives there, the vegetational climax would have been woodland instead of grassland. On the other hand, the cold-intolerance of *Eucalyptus* species set the altitudinal tree limit in S.E. Australia at 6,000 ft., whereas in California, under similar conditions, conifers reached 11,000 ft.

2732. SCHRETZENMAYR, M. Die Leitgesellschaft—ein Arbeitshypothese forstlich und pflanzengeographisch ausgerichteter Pflanzensoziologie. **[The 'Leitgesellschaft'—an ecological working hypothesis in the service of forestry and plant geography.]** *Forstwiss. Cbl.* 69 (11), 1950 (662–9). [G.]

A discussion of the application to silviculture of the concept of the 'Leitgesellschaft' i.e. a plant community of an individual kind, occurring so frequently within a certain area that it maybe considered typical of it.

2733. REGEL, C. Dynamik von Klima und Pflanzendecke in Nordeuropa. **[Dynamics of climate and vegetation in northern Europe.]** *Bericht über das Geobotanische Forschungsinstitut Rübel in Zürich für das Jahr 1949*, 1950 (11–23). 21 refs. [G.]

Discusses changes in climate and their influence on fluctuations of the northern tree limit, and on changes of forest type in northern areas.

2734. LUTZ, J. L. Übersicht der ausseralpinen Waldgesellschaften Süddeutschlands. **[Survey of the outer Alpine forest associations of southern Germany.]** *Forstwiss. Cbl.* 68 (2), 1949 (76–114). Numerous refs. [G.]

2735. KNAPP, R. Wald und Steppe im östlichen Nieder-Österreich. **[Forest and steppe in the eastern part of lower Austria.]** *Biol. Zbl.* 70 (1/2), 1951 (85–91). 11 refs. [G.g.] E.M.B.

An ecological study.

2736. KLIKA, J. **Bibliography of the geobotanical literature of Czechoslovakia (1938–1948).** *Vegetatio* 1 (4/5), 1948 (1949), (333–6). [E.] A.P.B.

2737. YEN-TCHENG, T. Études écologiques et phytosociologiques sur les forêts riveraines du Bas-Languedoc (*Populetum albae*). I, III, IV. **[Ecological and phytosociological studies of the riparian forests of lower Languedoc (*Populetum albae*) I, III, IV.]** *Vegetatio* 1 (1; 4/5; 6), 1948–49 (2–28; 217–57; 347–84 + 2 tbls.). Numerous refs. [F.f.] A.P.B.

[For Part II see *For. Abstr.* 11 (No. 2562.] The riparian vegetation of lower Languedoc consists of several distinct associations forming belts parallel with the river banks. The most important of these is the *Populetum albae* which is the only deciduous forest association of this region. To-day it is found mainly along watercourses and in low-lying plains, and occupies only very limited areas, rarely exceeding 1 ha. The author presents a detailed study of the association, its composition, microclimate, soils, biology, and the physiology of the species. The *Populetum albae* shows 3 distinct phases in the course of its evolution. The initial phase is characterized by dense formations of Willows, the final phase by good development of the trees and complete stratification. From the geographical point of view the *Populetum albae* marks the limits of northern vegetation types in the Mediterranean region. Ash is the most valuable of its species and is recommended for planting. The association plays an important part in controlling flooding and erosion, and for this reason protection of the relics of old forest and even the creation of new forest would bring great advantages.

2738. BERG, L. S. **Natural regions of the U.S.S.R.** MacMillan Co., New York. 1950. pp. xxi + 436 + 81 photos. Many refs. Translated by O. A. Titelbaum and edited by J. A. Morrison and C. C. Nikiforoff. Price £3 15*s*.

First published in Russian in 1937 under the title *Priroda S.S.S.R.*

2739. MORK, E. Om fjellskog og skoggrenser. **[Hill forests and forest limits.]** *Repr.* from *Skogen og Klimaet* 1946. [Nor.] Published by Bergens Museum (Det Geofysiske Institutt), 1948.

The forest limits for an area on the boundary of Opland and Hedemark are defined and temperature readings over several years are given. The limiting factors for tree growth appear to be the summer temperature and the occurrence of spring frosts.

2740. NOIRFALISE, A., and GALOUX, A. Les étages de végétation dans l'Ardenne belge. **[Vegetation zones in the Belgian Ardennes.]** *Communication, Centre de Recherches écologiques et phytosociologiques de Gembloux* No. 11, 1950. pp. 16 + tbl. + 3 maps. 14 refs. [F.flem.]

2741. REGINSTER, P. Le Plateau des Tailles: cartographie des associations végétales forestières dans leurs rapports avec la sylviculture. **[Mapping the forest vegetation associations of the Plateau des Tailles in relation to silviculture.]** *Bull. Soc. for. Belg.* 58 (1), 1951 (1–9). [F.]

Summarizes the vegetation types as determined for the soil and vegetation map of Belgium.

2742. FURRER, E. Schweizerische Vegetationsforschung von 1938 bis 1948 (mit einer Karte). **[Vegetation studies in Switzerland from 1938 to 1948 (with a map).]** *Vegetatio* 2 (2/3), 1949 (1950), (197–213). 90 refs. [G.] A.P.B.

A summary of work within the decade (including a section on the forests) with a comprehensive bibliography.

2743. BRAUN-BLANQUET, J. Übersicht der Pflanzengesellschaften Rätiens. I–VI. **[Survey of the plant associations of Rhaetia.]** *Vegetatio* 1 (1; 2/3; 4/5), 1948–49 (29–41; 129–46; 285–316); 2 (1; 2/3; 4/5), 1949–50 (20–37; 214–37; 341–60 + numerous photos). Numerous refs. [G.] A.P.B.

2744. MEYER, P. Das *Mastigobryeto-Piceetum abietetosum* im schweizerischen Mittelland und seine forstlich-waldbauliche Bedeutung. **[The *Mastigobryeto-Piceetum abietetosum* of central Switzerland and its silvicultural significance.]** *Vegetatio* 1 (4/5), 1948 (1949), (203–16 + 1 map + 1 tbl. + 8 photos). 33 refs. [G.f.] A.P.B.

Describes the association, which covers a fairly large area of central Switzerland and is one of those forming the selection forest of Emmental. The *Mastigobryeto-Piceetum abietetosum* is important for its ability to colonize degraded sites. It should be possible to convert poor Spruce stands to it by planting or encouraging natural regeneration of *Abies alba*. With good management such a forest can produce an annual increment of over 10 cu.m./ha. It remains to discover, however, whether this type of association furthers or prevents degradation of the soil.

2745. MARKGRAF, F. Eine neue Höhenstufenkarte der Vegetation Albaniens. **[A new map of Albania showing altitudinal limits of plant associations.]** *Bericht über das Geobotanische Forschungsinstitut Rübel in Zürich für das Jahr 1948*, 1949 (109–19 + 1 map). 10 refs. [G.] L.S.

2746. ČERNJAVSKI, P. Problem klasifikacije fitocenoza. **[The problem of the classification of phytocenoses.]** *Glasn. šum. Fak., Beograd* No. 1, 1950 (53–74). 40 refs. [Serb.f.]

The forest associations in Jugoslavia consists of a number of parallel series: *Pineto-Quercetum ilicis*, *Pineto-Quercetum cocciferae*, *Pineto-Quercetum macedonicae*, *Pineto-Quercetum confertae cerris*, *Pinetum silvestris*, *Piceeto-Fagetum*. Each series is found at a definite zone of altitude.

2747. HORVAT, I. Istraživanje i kartiranje vegetacije planinskog skupa Risnjaka i Snježnika. **[Exploration and mapping of the vegetation of the Risnjak and Snježnik mountains.]** *Šum. List* 74 (3/4), 1950 (97–118). [Croat.f.]

A preliminary report on the vegetation types in this area of Western Croatia. A full report of the investigations, by representatives of various sciences, will be published later. The area investigated forms a partition between the continental forests of the association *Querceto-Carpinetum croaticum* and littoral forests of the association *Carpinetum orientale croaticum*. The basic, neutral, or slightly acid soils of the area are covered mainly by the association *Fagetum croaticum abietetosum*, passing, with increasing altitude, into *Fagetum croaticum subalpinum*, and still higher into *Pinetum mughi croaticum*. Acid soils carry forests of the association *Abieto-Blechnetum*, characterized by the extraordinary height of the stems. Spruce does not form a special storey in Croatia or Bosnia, being confined to colder portions of *Fageta* or *Abieteta*. Apart from botanical investigations, the area was examined climatologically and pedologically and wood specimens were taken for testing their technological properties.

2748. EDWARDS, M. V. **Burma forest types (according to Champion's classification).** *Indian For. Rec.* (*n.s.*) *Silviculture* 7 (2), 1950 (135–73). 14 refs.

A standardized classification of forest types in Burma was brought into use in 1925 but proved inadequate for detailed work. Champion's system of forest types is more comprehensive, but needs some adaptation to make it fit conditions in Burma. It is proposed to rename his type 3a/C2, 'Burma tropical moist deciduous forest' as 'Burma tropical *upper* moist deciduous forest', and to refer to the plains climax as 3a/C3 'Burma tropical *lower* moist deciduous forest', to which Champion's Tr. M/IS/7a 'Southern tropical moist deciduous riverain forest' is seral.

A type of forest common in upper Burma, designated 'Evergreen dipterocarp and mixed evergreen forest' is described, followed by a characterization of 'Deciduous dipterocarp and mixed evergreen forest'.

The northern Burma types do not fit into Champion's classification, and alterations to suit Kingdon Ward's descriptions are made. Two tables are given, showing Burma standard types with cross-references to Champion's types and *vice versa*.

2749. SCHNELL, R. État actuel des recherches sur la végétation de l'Afrique intertropicale française. **[Present state of research on the vegetation of French tropical Africa.]** *Vegetatio* 2 (4/5), 1949 (1950), (331–40). Numerous refs. [F.] A.P.B.

A review of literature.

2750. SCHMID, E. Zur Vegetationsanalyse numidischer Eichenwälder. **[Analysis of the vegetation of the Numidian Oak forests.]** *Bericht über das Geobotanische Forschungsinstitut Rübel in Zürich für das Jahr 1949*, 1950 (23–39). [G.]

An exposition of the analytic method used in studies made in April 1949.

2751. SCHNELL, R. Essai de synthèse biogéographique sur la région forestière d'Afrique occidentale. **[An attempt at biogeographical synthesis for the forest region of West Africa.]** *Notes africaines, Dakar* No. 40, 1948 (29–33). [F.]

Traces the fluctuations of the forest in French Guinea in historic and prehistoric times.

2752. DUVIGNEAUD, P. Sur la véritable identité du *Parinari* sp. 'Mafuca' de Gossweiler et sur l'existence d'une laurisilve de transition Guineo-Zambézienne. **[The true identity of Gossweiler's *Parinari* sp. 'Mafuca' and the existence of a transitional forest of the 'Laurisilvae' type between the Guinean and Zambesian regions.]** *Bull. Soc. Bot. Belg.* 83 (1), 1950 (105–10). 9 refs. [F.] O.B.D.

The groups described by Gossweiler and Mendonça as consisting of *Parinari* sp. 'Mafuca' and *Daniella oliveri* [cf. *For. Abstr.* 9 (No. 143)] are in fact *Marquesia macroura* and *D. alsteeniana* and the formation to which the groups belong is classed by the author among the 'Laurisilvae', but of a special type characterized by the complete absence of gymnosperms. The author asserts the existence of a transitional forest of the 'Laurisilvae' type bridging the gap between the equatorial rain forest of Guinea and the open forests of the Zambesi region.

2753. SCHNELL, R. Remarques préliminaires sur les groupements végétaux de la forêt dense ouest-africaine. **[Preliminary remarks on the vegetation groups of the dense West African forests.]** *Bulletin de l'Institut Français d'Afrique Noire, Dakar* 12 (2), 1950 (297–314). 26 refs. [F.] L.S.

Presents a tentative classification of the groups of the equatorial forests of West Africa.

2754. WHITE, F. **The forests of Mt. Kenya.** *J. Oxf. Univ. For. Soc.* (*Ser. 3*) No. 5, 1950 (32–8 + 1 photo, 1 map).

2755. HALLIDAY, W. E. D. **Climate, soils and forests of Canada.** *For. Chron.* 26 (4), 1950 (287–301).

2756. LEOPOLD, A. S. **Vegetation zones of Mexico.** *Ecology* 31 (4), 1950 (507–18). 58 refs.

2757. VISHER, S. S. **High temperatures and the seasonal distribution of precipitation and some ecological consequences or correlations.** *Amer. Midl. Nat.* 44 (2), 1950 (478–87). 45 refs.

Analyses climatic data for the U.S.A. and gives 17 maps showing correlations between vegetation types and climatic zones.

2758. BUELL, M. F., and CANTLON, J. E. **A study of two communities of the New Jersey Pine barrens and a comparison of methods.** *Ecology* 31 (4), 1950 (567–86). 39 refs.

The structure of the vegetation of two upland forest communities occurring near the centre of the Pine region of New Jersey is compared. Frequency, density, basal area and cover data are presented. The two communities occur in the same general area and on similar soil types. The major factor determining the difference in composition seems to be age as influenced by fire history. The younger community is composed primarily of *Pinus rigida* and *P. echinata* with smaller amounts of *Quercus velutina*, *Q. stellata* and *Q. marilandica*. The understorey is a mixture of ericaceous shrubs and scrub Oaks. The older community is composed primarily of *Quercus montana* and *Q. velutina* with smaller amounts of *Pinus rigida*, *Q. stellata* and *Q. marilandica*. The understorey is composed primarily of ericaceous shrubs. The two communities seem to represent two stages in the succession toward the climax vegetation of the light Coastal Plain soils of the region. Their present status is probably a result of differential disturbance due to fire.

The quadrat method was used to obtain frequency, density and basal area for the species of the arborescent layer. The transect method

was used to obtain cover, open space, basal area, frequency, and numerical abundance for the species of the tree layer, and cover and open space for the species of the shrub layer. A cover sight is described which permits accurate measurement of cover and open space in the tree canopy. Dominance among the species in the tree layers, as indicated by % of total cover and % of total basal area, is compared. The use of cover instead of basal area, for expressing dominance, favours the large-crowned species. This tendency is accentuated when linear measurements are squared. Frequency, density and basal area obtained by both methods are compared. The transect method results in a greater % of all three values for the species having large crowns. Relationships between open space in the tree layer and shrubby cover are implied, but the data on these relationships are inconclusive. In view of the greater value of cover, as compared with frequency, density, and basal area, in expressing community structure, and in view of the possibility of accurate measurement of open space for use in studying tree/shrub/herb relationships, the transect method shows promise. *From authors' summary.*

2759. STERN, W. L., and BUELL, M. F. **Life-form spectra of New Jersey Pine barrens forest and Minnesota Jack Pine forest.** *Bull. Torrey bot. Cl.* 78 (1), 1951 (61–5). 12 refs. O.B.D.

Life-form spectra based on species lists for two different climatic regions are compared with life-form spectra from the same regions based on quantitative data, i.e. area covered by the different life forms. Significant differences between the 2 types of spectrum are evident. The latter method yields results probably more indicative of the contribution of the plants to the vegetation as a whole.

2760. OOSTING, H. J., and BILLINGS, W. D. **A comparison of virgin Spruce/Fir forest in the northern and southern Appalachian system.** *Ecology* 32 (1), 1951 (84–103). 29 refs.

On the basis of physiognomy and composition it is maintained that the Spruce/Fir forest of the Appalachians is distinct but yet a part of the boreal forest formation. Floristic and ecological differences in the north and south are such that two phases should be recognized—*Picea rubens/Abies fraseri* and *P. rubens/A. balsamea. From authors' summary.*

2761. AIKMAN, J. M., and GILLY, C. L. **A comparison of the forest floras along the Des Moines and Missouri rivers.** *Proc. Iowa Acad. Sci.* 55, 1948 (63–73). 17 refs. A.P.B.

2762. GYSEL, L. W. **Borders and openings of Beech-Maple woodlands in Southern Michigan.** *J. For.* 49 (1), 1951 (13–19). 5 refs.

The total number of species and amount of cover of the vegetation of borders and openings were greater than those of the interiors. Statistically significant differences were the number of species per plot, and number of additional species per plot in relation to a selected plot.

2763. MAACK, R. Notas preliminares sôbre elima, solos e vegetação do estado do Paraná. [**Preliminary notes on climate, soils and vegetation of the state of Paraná.**] *Arquivos de Biologia e Tecnologia, Curitiba* 3, 1948 (99–200 + 25 plates + 1 map). 55 refs. [Port. port.e.g.] L.S.

A summary of 15 years' investigations and surveys, presenting an up-to-date picture of the vegetation distribution in Paraná, with some preliminary information on correlation between climate, soil and vegetation. The author asserts that the laterites and lateritic soils represent relics of an earlier period of the Pleistocene when an annual dry season alternated with a heavy rainy season. To this period also belong the grass steppes (*campos limpos*) and the scrub forest steppes (*campos cerrados*). Only under the influence of the more recent pluvial period has the expansion of the forests become possible. In a phytogeographical sense, therefore, the forests are younger than the '*campos*'. The advance of the forests has been checked in historical times, however, by burning and destructive methods of cultivation.

12.19.4. *Succession*

See also *For. Abstr.* 12
(Nos. 2572, 2574, 2737, 2817–8, 2868, 3353).

2764. KASSAS, M. **A fen woodland through 160 years.** *Abstr.* in *J. Anim. Ecol.* 19 (2), 1950 (212).

Describes a 40-acre conifer plantation on Chippenham Fen, near Newmarket. The trees planted on newly drained peat in 1791 were Scots Pine, Larch and Spruce, but several species of deciduous trees have established themselves since that date. From observations on the survival of the original plantings, the establishment of other woody species and the ground vegetation, the area may be divided into three zones arranged more or less symmetrically about a transverse axis. In the central zone (A) farthest from the marginal drains, 54% of the trees are *Fraxinus* less than 50 years old and 22% are *Quercus* less than 100 years old. In the intermediate zone (B) young trees of *Fraxinus* constitute 66·5% and *Acer pseudoplatanus* 20·1%; while in the marginal zone (C) adjoining the drains, *Fraxinus* and *Acer* are about equally abundant and account for almost 93% of all trees. In (A) the ground vegetation is dominated by *Molinia* with some *Phragmites*, in (B) by *Eupatorium cannabinum* and in (C) by *Hedera helix*. The zones were found to be delimited by peat-depth contours of 60 cm. (A/B) and 40 cm. (B/C) respectively. Zone (A) lies over a shallow valley in the original clay floor, where water tends to collect, as shown by observations of the height of the water table in pits dug for the purpose. It appears that *Quercus-Fraxinus-Acer* form a series in respect of tolerance of waterlogging, *Quercus* being most and *Acer* least tolerant. Counts and width measurements of the tree rings showed consistently a first period, *ca.* 1800–50, when rings were wide; a second, *ca.* 1851–1915, when they were narrow, and a third, 1915–49, when they were wide except during the years 1932–43. Trees outside the plantation showed a uniform ring width. Historical records explain these variations in terms of the effectiveness of the drains, 'numerous and deep' as first cut by Tharp in 1791, but become so choked by 1903 that *Selinum carvifolia* was seen that year in 18–24 in. of water. The drains were cleared in 1918 and again in 1942, wider rings following each operation. These great changes in drainage explain also the present distribution of species and age groups in the three zones. Most of the trees originally planted in (A) have died, maximum survival being in (C). Colonization by self-sown *Betula* and *Fraxinus* started before 1850 and became rapid again after 1918, especially in (B), where the advantage of improved drainage was not offset, as in (C), by the shade cast by surviving old trees. Presumably for the same reasons, zone (B) has acquired a shrub layer of *Ligustrum* and *Prunus spinosa*.

2765. McMinn, R. G. **The vegetation of a burn near Blaney Lake, British Columbia.** *Ecology* 32 (1), 1951 (135–40). 3 refs.

A study was made of a logged and burned area (*Thuja/Tsuga* association) in the University of British Columbia Forest, in order to determine the succession on such a site. It was concluded that:—(*a*) Rock types were unlikely to return to conifers for a very long time. (*b*) The swamp and tangle types, where well developed, would retard the return of the forest and would be likely to persist after its development. (*c*) Bracken types can be invaded, provided that there is sufficient conifer seed. (*d*) Dense coniferous regeneration will develop into dense even-aged stands. (*e*) The Vine/Maple groups may resist coniferous invasion and persist in the forest. *From author's summary.*

12.2. *Special (Systematic) Botany*

See also *For. Abstr.* 12 (No. 2558).

12.21. Fungi

See also *For. Abstr.* 12 (Nos. 3050–4, 3370 *et seq.*).

2766. Findlay, W. P. K. **Tree and timber fungi.** *Trans. Brit. mycol. Soc.* 33 (3/4), 1950 (195–208). O.B.D.

A historical survey of research in this field.

2767. Hora, F. B. **A field key to four hundred common [British] mushrooms and toadstools.** *Reading Naturalist* 1 (2), 1950 (2–58). 7 refs.

2768. Doidge, E. M. **The South African fungi and lichens.** *Bothalia* 5, 1950 (1–1094 + 11 maps). Numerous refs.

Mainly a comprehensive list of species with a host index, locality index (with maps) and an extensive bibliography.

2769. Keener, P. D. **Mycoflora of buds. I. Results of cultures from non-irradiated materials of certain woody plants.** *Amer. J. Bot.* 37 (7), 1950 (520–7). 19 refs. O.B.D.

Several species of bacteria and fungi were isolated from dormant, opening, and newly formed foliage and flower buds of 10 out of 12 deciduous hardwood species. There were indications that, during flushing, bacteria and fungi were present in greater numbers than when buds were dormant or newly formed. Bud scales were the chief loci for the micro-organisms found, the outer scales being more frequently inhabited than the inner. The micro-organisms were typical soil-inhabiting bacteria and fungi belonging to the Ascomycetes, Fungi imperfecti, and Phycomycetes. *From author's summary.*

2770. Douglas, A. [Compiler]. ***Merulius lacrymans.*** *Bibliogr. Ser. For. Prod. Aust.* No. 42, 1950. pp. 13.

12.25. Gymnosperms

2771. Villar, E.-H. del. Quel est le nom valable du *Pinus laricio* Poir? **[What is the valid name of *P. laricio* Poir?]** *Berichte der schweizerischen botanischen Gesellschaft, Bern* 57, 1947 (149–55). [F.] L.S.

The author recognizes 2 groups in *P. nigra* Arn. (*P. laricio* Poir.) and presents evidence to support his thesis that, assuming the existence of 2 groups in *P. nigra*, the western one is properly *P. clusiana* Clem. in Ar., and the eastern, *P. nigricans* Host. Varieties and subspecies are described.

2772. Thomson, A. P. **Bibliography of *Pinus radiata.*** *For. Res. Notes N.Z. For. Serv.* 1 (1), 1950 (1–14).

2773. Martínez, M. Las coníferas silvestres del Valle de México. **[The indigenous conifers of the central Mexican basin.]** *Boletín de la Sociedad Botánica de México, México* No. 7, 1948 (1–20). [Span.] L.S.

Illustrated descriptions of the native species of *Pinus, Abies, Cupressus* and *Juniperus*, and also of some exotic species.

2774. Martinez, M. El ahuehuete (*Taxodium mucronatum* Ten.)—séptima contribución al estudio de las Pináceas méxicanas. **[*Taxodium mucronatum*—seventh contribution to the study of the Mexican Pinaceae.]** *An. Inst. Biol. Univ. Méx.* 21 (1), 1950 (25–82 + 1 map). 53 refs. [Span.] C.G.B.

A botanical and morphological account of the tree, with descriptions of some well known individuals and stands, and a discussion of the tree's therapeutic properties.

2775. Gray, N. E., and Buchholz, J. T. **A taxonomic revision of *Podocarpus*. V. The South Pacific species of *Podocarpus*: section *Stachycarpus*.** *J. Arnold Arbor.* 32 (1), 1951 (82–92 + 4 plates). 20 refs.

Cf. *For. Abstr.* 10 (No. 118).

2776. Gray, N. E., and Buchholz, J. T. **A taxonomic revision of *Podocarpus*. VI. The South Pacific species of *Podocarpus*: section *Sundacarpus*.** *J. Arnold Arbor.* 32 (1), 1951 (93–7). 5 refs.

12.26-8. Dicotyledons

See also *For. Abstr.* 12 (No. 2982).

2777. Neger, F. W., Münch, E., and Huber, B. Die Laubhölzer. **[The broad-leaved tree and shrub species [of Central Europe].]** Walter de Gruyter & Co., Berlin. 3rd ed., 1950. pp. 143. [G.] Price *DM* 2.40 [*4s. 6d.*].

2778. Gagnepain, F. Genres nouveaux, espèces nouvelles d'Indochine (II^e^ P.). **[New genera and species from Indo-China (Pt. II).]** *Phanérogamie* 14 (1), 1950 (22–37). [F.] O.B.D.

Includes the following new tree species:—*Alangium tonkinense, Kerrdora laotica* and *Saxifragites latifolius.*

2779. Hack, R. B. **Notes on trees of Chirinda Forest, Mount Selinda.** *Rhod. agric. J.* 47 (5), 1950 (398–404). E.M.B.

Also as *Bull. Minist. Agric. Lds., S. Rhod.* No. 1544. pp. 8.

2780. Pavari, A. Nota su *Acer lobelii* Ten. **[Note on *A. lobelii.*]** *Nuovo G. bot. ital.* (*n.s.*) 56 (4), 1949 (535–56 + 3 photos). 12 refs. [It.it.e.] A.P.B.

Discusses in detail the reasons for giving *A. lobelii* specific status.

2781. Kadambi, K. ***Lannea grandis*, Engler (syn. *Lannea woodier, Odina wodier*, Roxb.).** *Indian For.* 76 (12), 1950 (529–38 + 1 photo, 1 map). 22 refs.

Taxonomy, ecology, silviculture, properties and uses.

2782. FRIES, R. E. **Contributions to the knowledge of the Annonaceae in northern South America.** *Ark. Bot.* 1 (4), 1950 (329–47 + 7 plates). O.B.D.

Describes a number of new tree species.

2783. SCHNELL, R. Notes et observations sur divers *Strophanthus* d'Afrique occidentale. **[Notes and observations on some *Strophanthus* species of West Africa.]** *Rev. int. Bot. appl. Agric. trop.* 30 (337/338), 1950 (588–603). 3 refs. [F.] P.R.

Notes on the distribution of *S. sarmentosus*, *S. hispidus*, *S. preussii*, *S. barteri* and *S. gratus*, their morphology, conditions favouring and seasons of flowering and fruiting, variations on specific type (especially in *S. sarmentosus* and *S. hispidus*), vernacular names, and native uses. [Cf. *For. Abstr.* 12 (Nos. 2710, 3273).]

2784. PACLT, J. Sur la cloison dans les capsules du genre *Catalpa* de la famille Bignoniacées. **[The septum in the capsules of the genus *Catalpa* (Bignoniaceae).]** *Berichte der schweizerischen botanischen Gesellschaft, Bern* 57, 1947 (115–21). 3 refs. [F.] L.S.

The septum as an aid to identification of *C. ovata*, *C. bignonioides* and *C. speciosa*.

2785. TROUPIN, G. Les Burseraceae du Congo Belge et du Ruanda-Urundi. **[The Burseraceae of the Belgian Congo and Ruanda-Urundi.]** *Bull. Soc. Bot. Belg.* 83 (1), 1950 (111–28). 5 refs. [F.] O.B.D.

2786. ROBERTY, G. Notululae ex herbario ifani extractae. **[Notes based on the collections in the herbarium of the Institut français d'Afrique noire.]** *Notes africaines, Dakar* No. 40, 1948 (9–12). [F.]

A revision of the family Combretaceae.

2787. RICKETT, H. W. ***Cornus* in Mexico with notes on the evolution of the genus.** *An. Inst. Biol. Univ. Méx.* 21 (1), 1950 (83–94). C.G.B.

2788. ALLARD, H. A. **The Sandbox tree and its armament.** *Bull. Torrey bot. Cl.* 77 (6), 1950 (509–15). O.B.D.

A description of *Hura crepitans* with special reference to its exploding fruit capsules.

2789. ČERNJAVSKI, P. Prethodno saopštenje o balkanskoj bukvi. **[Preliminary note on the Balkan Beech.]** *Godišnj. biol. Inst., Sarajevo* 1 (1), 1948 (41–3). 5 refs. [Serb.e.]

Maintains the existence of a Balkan species of Beech, *F. moesiaca*, distinct from *F. sylvatica* and not an intermediate or hybrid between the latter and *F. orientalis*. [Cf. *For. Abstr.* 11 (No. 161).]

2790. ROBYNS, W., and WILCZEK, R. Contribution à l'étude des Lauracées du Congo Belge et de l'Afrique Tropicale. **[Contribution to the study of the Lauraceae of the Belgian Congo and tropical Africa.]** *Bull. Jard. bot. Brux.* 19 (4), 1949 (457–507). 13 refs. [F.] O.B.D.

Includes descriptions of several new species of *Beilschmiedia*.

2791. SMITH, A. C. **Studies of Pacific Island plants. VIII. The Fijian species of Lauraceae.** *J. Arnold Arbor.* 32 (1), 1951 (27–58).

Includes keys to the genera and species, and descriptions of some new tree species.

2792. LÉONARD, J. **Notulae systematicae IV. (Caesalpiniaceae-Amherstieae africanae americanaeque.)** *Bull. Jard. bot. Brux.* 19 (4), 1949 (383–408). 13 refs. [F.] O.B.D.

Describes several new species.

2793. LÉONARD, J. Étude botanique des copaliers du Congo Belge. **[A botanical study of the copal-bearing trees of the Belgian Congo.]** *Publ. Inst. nat. Étude agron. Congo Belge (Sér. sci.)* No. 45, 1950. pp. 158 + 23 photos. 106 refs. [F.f.]

The general discussion in this publication has already appeared in the Bulletin of INÉAC [cf. *For. Abstr.* 12 (No. 1027)]. The complete work includes botanical notes on each species.

2794. CHEVALIER, A. Sur un copalier soudanais (*Guibertia vuilletiana* Chev.) adapté à la vie de savane et confondu avec *G. copallifera* J. Benn. de la forêt. **[A copal tree (*G. vuilletiana*) adapted to the savannah and confused with *G. copallifera* of the forest.]** *Rev. int. Bot. appl. Agric. trop.* 30 (337/338), 1950 (630–3). [F.] P.R.

2795. DWYER, J. D. **The Central American, West Indian, and South American species of *Copaifera* (Caesalpiniaceae).** *Brittonia, N.Y.* 7 (3), 1951 (143–72).

2796. HEWETSON, C. E. **Occurrence of *Melia composita* (Willd.) in Allapalli range South Chanda M.P.** *Indian For.* 76 (12), 1950 (540).

2797. LÉONARD, J. *Lepidobotrys* Engl., type d'une famille nouvelle de Spermatophytes: les Lepidobotryaceae. [***Lepidobotrys* Engl., type of a new family of the Spermatophyta, the Lepidobotryaceae.**] *Bull. Jard. bot. Brux.* 20 (1), 1950 (31–40). 11 refs. [F.] O.B.D.

Since the monospecific genus *Lepidobotrys* cannot be included in any known family the author proposes the new family Lepidobotryaceae.

2798. LÉONARD, J., and TROUPIN, G. Observations sur le genre *Okoubaka* Pellegr. et Normand (Octoknemaceae). [**Observations on the genus *Okoubaka* (Octoknemaceae).**] *Bull. Jard. bot. Brux.* 20 (1), 1950 (11–4). [F.] O.B.D.

A revision of the genus on the discovery of a new species, *O. michelsonii*.

2799. ROL, R., and VENET, J. Le platane. [**The Plane.**] *Rev. Bois Appl.* 6 (1), 1951 (5–8). [F.] P.R.

Deals with the taxonomy of *Platanus*, the habitat, wood structure, principal physical and mechanical properties, working qualities, principal uses, and defects.

2800. WHITE, C. T. ***Finschia*—a genus of 'nut' trees of the Southwest Pacific.** *Pacific Science, Honolulu* 3 (3), 1949 (187–94). 12 refs. L.S.

2801. KÁRPÁTI, Z. Taxonomische Studien über die zwischen *Sorbus aria* und *S. torminalis* stehenden Arten und Bastarde im Karpathenbecken. [**Taxonomic studies on species and hybrids of *Sorbus* in the Carpathian basin intermediate between *S. aria* and *S. torminalis*.**] *Hungarica Acta Biologica, Budapest* 1 (3), 1949 (94–125 + 1 plate). 50 refs. [G.] L.S.

2802. REEDER, J. R., and CHEO, S.-Y. **Notes on *Xanthoxylum* and *Fagara* in China.** *J. Arnold Arbor.* 32 (1), 1951 (67–72 + 2 plates).

Includes a description of a new species, *Fagara robiginosa*.

2803. BOUTIQUE, R., and TROUPIN, G. Theaceae, famille nouvelle pour la flore du Congo Belge. [**Theaceae, a family new to the flora of the Belgian Congo.**] *Bull. Jard. bot. Brux.* 20 (1), 1950 (61–6). 5 refs. [F.] O.B.D.

Describes *Adinandra intermedia* sp. nov., found in the Kivu mountains, and forming a link between the area of distribution of the other two known African species, *A. mannii* and *A. schliebenii*. A key to the African species of *Andinandra* is presented.

12.29. Monocotyledons

2804. BOMHARD, M. L. **Palm trees in the United States.** *Agricultural Information Bulletin, U.S. Department of Agriculture*, No. 22, 1950. pp. 26. 15 refs. Price 15 cents.

13. FOREST ZOOLOGY

See also *For. Abstr.* 12 (Nos. 2617–20, 3053–61, 3268, 3418 *et seq.*).

2805. MORRIS, R. F. **Technique for [insect] population sampling on standing trees.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (6), 1950 (1–2).

On young trees up to 30 or 35 ft. in height, the entire length of crown can easily be reached with aluminium pole-pruners made up of 5-ft. interlocking sections. The cutting blade is operated by a pull cord, and a spring clamp attached to the blade holds the cut branch until it is swung out of the crown and released over a small ground-sheet. For taller trees a modified ladder [illustrated] has recently been devised. A 38-ft. extension ladder is fitted with a folding brace which holds the pole operator about 8 ft. from the tree, thus permitting unobstructed access to any part of the crown. The bottom section of the ladder is held upright, the extension is raised by means of a pulley, and the ladder is then allowed to tip until the brace rests against the tree. Three guy ropes are used to manoeuvre the ladder and to hold it steady in position. As an added precaution, the operator attaches himself to the top of the ladder with a safety belt. The cut branches, like those from the smaller trees, are released from the pole-pruner so that they fall to a canvas sheet under the ladder.

This apparatus was tested for Spruce-budworm sampling during 1950 and found very

satisfactory for trees up to 70 ft. high. Aluminium extension ladders are now available, which permit greater ease in handling. The sample branches are whole primaries selected, as nearly as possible, to represent each vertical quarter of the crown. It was found that a crew of 4 men could obtain samples from 15–20 mature trees a day by this method. After the ladder was in position, the guy ropes were attached to adjacent trees, leaving 3 men free to measure the branches as they fell and to cut them into smaller pieces for further examination. The method can be equally well applied to e.g. cone collection.

2806. ROONWAL, M. L., BHASIN, G. D., and PANT, G. D. **A systematic catalogue of the main identified entomological collection at the Forest Research Institute, Dehra Dun. Parts 1–3. Introduction; Subclass Apterygota; Subclass Pterygota, Order Orthoptera (in part), Family Blattidae.** *Indian For.* 76 (11), 1950 (498–505).

2807. MATHUR, R. N. **Biological notes on *Metanastria hyrtaca* Cram. (Lepidoptera : Lasiocampidae).** *Indian For.* 76 (12), 1950 (539). 3 refs.

2808. MATHUR, R. N. **Larvae of two species of Anthribidae.** *Indian For. Rec.* 8 (3), 1950 (13–6 + 12 drawings). 3 refs.

Rawasia annulipes and *Phloeobius alternans.*

2809. GRESSIT, J. L. **Indian longicorn beetles (Coleoptera, Cerambycidae). Part 1. [Sub-family Prioninae.]** *Indian For. Rec.* 8 (2), 1950 (9–11).

2810. FISHER, W. S. **A revision of the North American species of beetles belonging to the family Bostrichidae.** *Misc. Publ. U.S. Dep. Agric.* No. 698, 1950. pp. 157. Many refs. P.R.

2811. PARK, O., AUERBACH, S., and CORLEY, G. **The tree-hole habitat with emphasis on the pselaphid beetle fauna.** *Bulletin of the Chicago Academy of Sciences* 9 (2), 1950 (19–57). 69 refs.

2812. SCHEDL, K. E. Beitrag zur Morphologie und Systematik der Scolytoidea. **[Morphology and systematy of the Scolytoidea [in the Belgian Congo].]** *Rev. Zool. Bot. afr.* 43 (3/4), 1950 (203–10). [G.]

Includes descriptions of the following new species:—*Hapalogenus congonus*, *Xylocleptes concavifrons*, *X. usambaricus*, *Xyleborus okoumeensis*, and *X. raucus.*

2813. CLARK, L. R. **On the abundance of the Australian plague locust *Chortoicetes terminifera* (Walker) in relation to the presence of trees.** *Repr.* from *Australian Journal of Agricultural Research* 1 (1), 1950 (64–75).

By the use of belt transects through selected tree stands, in the Bogan-Macquarie Outbreak Area of *Chortoicetes terminifera*, it was possible to show quantitatively that the abundance of non-swarming locusts is greatly limited by the presence of trees. Thus, if the former community dominants were re-established in those outbreak centres that were originally densely timbered, the production of swarms in them would probably be prevented, and locust damage thereby reduced.

It was found that the abundance of adult locusts within tree stands is not related to tree density, as such, but to a 'barrier effect' of trees in depth, acting in such a way as to diminish the chances that an individual will penetrate to a given depth in the stand as that depth is increased. Hoppers (predominantly 4th instar), the non-swarming residue of bands hatching outside tree stands, appear to be similarly affected. On the other hand, the population density of hoppers hatching within stands, both at the time of hatching and when the majority reach the 4th instar, is correlated with tree density as well as with distance within the stand, suggesting that adult female locusts are influenced by tree density in their selection of oviposition sites. The effect of tree density, as such, on the density distribution of locusts apparently disappears gradually as locusts grow and become increasingly mobile, because after they reach the adult stage the relationship no longer exists.

The evidence obtained suggests that the limiting effect of trees on locust abundance is largely due to the reduction of light intensity that they bring about, the insects being affected through their positive phototactic response. *From author's summary.*

2814. MCGREGOR, E. A. **Mites of the family Tetranychidae.** *Amer. Midl. Nat.* 44 (2), 1950 (257–420).

Revision of the family.

2815. DIRKS-EDMUNDS, J. C. **A comparison of biotic communities of the Cedar/Hemlock and Oak/Hickory associations.** *Ecol. Monogr.* 17 (3), 1947 (235–60). 46 refs.

2816. DOWDY, W. W. **Further ecological studies on stratification of the Arthropoda [in an Oak/Hickory and a Red Cedar stand in Missouri].** *Ecology* 32 (1), 1951 (37–52). 12 refs.

A larger number of species and of specimens was taken in each stratum of the Oak/Hickory association than in the corresponding stratum of the Cedar consocies, but the basic pattern of stratification was the same in both communities.

2817. ODUM, E. P. **Bird populations of the highlands (North Carolina) plateau in relation to plant succession and avian invasion.** *Ecology* 31 (4), 1950 (587–605). 17 refs.

Breeding bird populations were measured on 6 plots representing (*a*) shrubland, (*b*) intermediate forest, and (*c*) mature or climax forest stages in each of two community series, the Hemlock and the Oak/Chestnut series. Population density was high in stage (*a*) of both series. In the Oak/Chestnut series, density was less in stages (*b*) and (*c*), whereas in the Hemlock sere high populations were maintained or even increased in stages (*b*) and (*c*), owing, it is believed, to their greater moisture and the greater development of shrub understorey. *From author's summary.*

2818. BUMP, G. **Wildlife habitat changes in the Connecticut Hill Game Management Area.** *Mem. Cornell agric. Exp. Sta.* No. 289, 1950. pp. 75. 30 refs.

Analyses the succession of vegetation during 20 years, and its effect on wildlife, especially game.

2819. GRASSE, J. E. **Beaver ecology and management in the Rockies.** *J. For.* 49 (1), 1951 (3–5).

2. SILVICULTURE

2820. BAKER, F. S. **Principles of silviculture.** McGraw-Hill Book Company, Inc., New York. 1950. pp. xii + 414. 519 refs. Price [£2. 2*s*. 6*d*.]

The work, which deals mainly with conditions in North America, is divided into the following sections:—forests in general; their form and composition; ecological classifications of forests; classification by site quality and density; tolerance and crown classes; water supply of the forest; utilization of water by the forest; the photosynthetic process; nitrogen and mineral nutrition (forest soils); production of seed; dissemination of seed; overwintering losses of seed; germination of seeds; establishment and mortality of seedlings; growth of trees in general; height growth of trees; growth of trees in diameter; growth of trees in volume; growth of stands; and the biology of the growth of stands.

2821. **Forestry handbook for the Upper Mississippi region.** *Agric. Handb. U.S. Dep. Agric.* No. 13, 5th ed., 1950. pp. 101. Price 45 cents.

2822. LITTLE, S. JR. **Ecology and silviculture of White Cedar [*Chamaecyparis thyoides*] and associated hardwoods in Southern New Jersey.** *Bull. Yale Sch. For.* No. 56, 1950. pp. 103 + 9 plates. 125 refs.

2823. PEARSON, G. A. **Management of Ponderosa Pine in the Southwest as developed by research and experimental practice.** *Agriculture Monograph, U.S. Department of Agriculture* No. 6, 1950. pp. 218. 98 refs. Price 50 cents.

2824. **Red Pine in New York.** New York Section, Society of American Foresters. 1950. pp. 21. 27 refs. Price 25 cents.

Papers presented at the winter meeting of the N.Y. section of the Society of American Foresters, 9–10 Dec. 1949:—The natural distribution of Red Pine in New York (*D. B. Cook* and *R. H. Smith*); Seed sources and nursery practice of Red Pine (*E. J. Eliason*); Choice of site for Red Pine (*E. W. Littlefield*); A soil deficiency affecting Red Pine (*S. O. Heiberg* and *D. P. White*). [Severe stagnation of Red Pine on old-field soils was quickly relieved by the application of small amounts of K in easily soluble form.]; The more important insect pests of Red Pine in N.Y. State (*A. H. MacAndrews*); Management of pure Red Pine plantations

(*A. J. Woodford*); Growth and yield of Red Pine (*R. W. Benson*); and Utilization of Red Pine (*D. B. Cook*).

2825. Die Waldföhre: *Pinus silvestris*. **[Scots Pine.]** *Schweiz. Z. Forstw.* 101 (9), 1950 (496–504). [G.F.]

Summary of silvicultural data for Scots Pine in Switzerland.

2826. **Symposium on Ash as a forest tree in the British Isles.** *J. Ecol.* 38 (2), 1950 (409–12).

Résumés are given of the following papers read at a meeting of the British Ecological Society, 25 February, 1950, with some indication of discussions on them:—(1) Some features of the biology of Ash (*E. W. Jones*); Silviculture of Ash in Great Britain (*A. H. Popert*); Ash on old red sandstone in the west of England (*Sir Richard Cotterell*); The behaviour of Ash on Chippenham Fen (*M. Kassas*) [cf. *For. Abstr.* 12 (No. 2764)]; Some results of recent forest research on the cultivation of Ash (*R. F. Wood*).

2827. VIGNAUX, DU. La culture du peuplier. **[Poplar growing.]** *Action for. pisc.* No. 160, 1951 (1–3). [F.]

Summarizes the advice given by the Commission Nationale du Peuplier to intending growers.

[Cf. *For. Abstr.* 12 (Nos. 2686, 2907).]

2828. BRIGHTEN, C. W. **Cricket Bat Willow culture.** *Quart. J. For.* 45 (1), 1951 (30–5 + 4 photos).

Gives details of nursery formation, planting, and care and protection after planting, with notes on harvesting and marketing.

21. SILVICULTURAL CHARACTERS OF TREE SPECIES

See also *For. Abstr.* 12 (Nos. 2650, 2781, 2974, 3270, 3310).

21.0. *Adaptability to the General Environment. Acclimatization*

2829. ROL, R. L'aune à feuilles en coeur, essence de reboisement. **[*Alnus cordata*, a species for use in reforestation.]** *Rev. for. franç.* 1951 (2), (89–95 + 4 photos). 4 refs. [F.]

Discusses silvicultural characters and possible use in reforestation both as a soil improver and as a source of useful wood.

2830. MACIEJOWSKI, K. O przydatnosci daglezji dla lasow polskich i o jej roli w gospodarstwie lesnym. **[On the usefulness of Douglas Fir in Polish forests and its role in forest management.]** *Sylwan* 94 (1; 2), 1950 (58–75; 33–48). 24 refs. [Pol.e.]

A comprehensive study of Douglas Fir in Poland, comprising sections on (1) Douglas Fir in North America; (2) introduction and acclimatization of Douglas Fir in Europe and its usefulness in Central European forests; (3) Douglas Fir in Polish forests; (4) silviculture; (5) protection; (6) utilization. Gives a detailed account of the acclimatization of Douglas Fir in Central Europe, based on studies carried out in German (particularly Prussian) experimental plots since 1880 (cf. Kanzow, H., 'Die Douglasie', *Z. Forst- u. Jagdw.*, 1937). The var. *viridis* proved to be the most valuable of all foreign species introduced into German forests. Seed of this variety should be imported only from the optimum region (western slopes of the Cascade mountains in Washington State; lower stretch of the Fraser River in British Columbia; Oregon). Most of the former Prussian Douglas Fir areas (predominantly var. *viridis*) now belong to Poland. By summer 1949, seventeen areas totalling 47·36 ha. had pure or mixed Douglas Fir stands aged from 52 to 80 years. Height averaged 25–35 m., d.b.h. 30–48 cm. In 1926, the author made the following analysis in a 44-year-old stand: 988 trees per ha., average d.b.h. 25·1 cm., average height 21·6 m., total b.a. 49·00 sq. m./ha., total volume 604·13 cu.m./ha. The author recommends planting rather than direct sowing. Var. *glauca* should not be grown commercially; var. *caesia* should be tried in Eastern Poland, along with var. *viridis*. The author found that cones of var. *viridis* ripen between 20 September and 10 October. From 1 hl. (22 kg.) of cones *ca.* 0·7–0·9 kg., of seed was obtained in 1925 and 1928. The varieties *viridis* (and *caesia*, after testing) should be introduced to eastern and southern Poland into pure or mixed Pine stands on better sites, and into Oak and Hornbeam on medium sites. No Douglas Fir should be planted in places where Fir and Spruce appear in quantity. In western Poland, Douglas Fir

can be introduced almost everywhere. The best planting distance is 2·0 × 1·5 to 2·0 m. (2,500–3,000 plants/ha.). In the author's view the mass introduction of Douglas Fir into Poland is at least as important for the national economy as the encouragement of Larch and the search for a quick-growing Poplar.

2831. Nekrasova, T. P. Kultura listvennitsy na Kol'skom Poluostrove. [**Growing [Siberian] Larch on the Kola Peninsula.**] *Lesn. Khoz.* 1950 (2), (67–70). [Russ.]

Gives some details of several small-scale sowings and plantings of *L. sibirica*, none over 15 years old, in this region. Results so far suggest that it will succeed at altitudes below 200 m. and make considerably faster height growth than Scots Pine and Norway Spruce on burnt areas, where direct sowings have been satisfactory. Humus-iron podzols normally occupied by Spruce and Pine/Spruce forests of the *Hylocomium* type seem to suit it best. Burnt areas offer good opportunities for introducing it to supplement the rather scanty natural regeneration, particularly of Spruce, and to form valuable mixed stands in which it should easily keep ahead of the Pine and Spruce.

2832. Sakss, K. Svešzemju koku sugu ieaudzēšanas mēģinājumi dažās Latvijas PSR vietās. [**Researches on acclimatization of some foreign tree species in different regions of the Latvian S.S.R.**] *Mežsaimniecības Problemu Instituta Raksti, Latvijas PSR Zinātņu Akademija, Rīgā* No. 1, 1949 (7–36). 5 refs. [Lat.]

An account in some detail, with numerous illustrations and graphs, of exotics that have established themselves in some numbers in various parts of Latvia, e.g. *Fagus sylvatica, Pinus strobus, Abies nordmanniana, Larix decidua, Quercus borealis* var. *maxima, Pseudotsuga taxifolia, Picea abies* var. *alpestris* (in Talsi district), *P. taxifolia* and *Larix sibirica* (Ogre district) and *L. sibirica* (Walmiera district). These appear to have become completely acclimatized, for they survived even the hard winter of 1939–40 without much damage and have regenerated naturally. Of the above species, the following show good volume and height increment: *Fagus sylvatica*—pure stand (55 years) m.a.i. 8·5 cu.m./ha. in volume and 0·5 m. in height; mixed stand (43 years) 9 cu.m. and 0·47 m., (61 years) 6·4 cu.m. and 0·36 m. *Abies nordmanniana*—neglected mixed stand (56 years) 6·3 cu.m. and 0·36 m. *Pinus strobus*—mixed stand (53 years) 7·3 cu.m. and 0·63 m. *Larix sibirica*—pure stands (55 years) 13 cu.m. and 0·5 m., (53 years; poor soil) 5 cu.m. and 0·47 m., (95 years) 8·2 cu.m. and 0·31 m. *Larix decidua*—mixed stand (60 years; poor stocking) 10·6 cu.m. and 0·43 m., (62 years; densely stocked) 6·9 cu.m. and 0·42 m. *Pseudotsuga taxifolia*—pure stand (45 years) 5·6 cu.m. and 0·36 m. *Picea abies* var. *alpestris*—pure stand (on former arable land; 58 years) 12·8 cu.m. and 0·4 m. In mixed stands the m.a.i. is the equivalent growth of 1 ha. of a pure stand of that species. The most valuable of these exotic stands could be used to furnish seed for extended propagation of these species in Latvia.

2833. Novak, P. S. Introduktsiya evkaliptov v Lazarevskom lespromkhoze. [**Introduction of Eucalypts in the Lazarevski Lespromkhoz.**] *Lesn. Khoz.* 1950 (2), (90). [Russ.]

Preliminary trials in 1937 showed that the most northerly point of the Black Sea coast at which Eucalypts did not succumb to frost, was Lazarevskaya, N. of Sochi. Further trials were started in this district. Seed of 4 species ['Willow-leaved' (*E. amygdalina*?), *E. macarthuri*, 'Grey' (*E. cinerea*?) and 'Blue' (*E. globulus*?)] was sown in a greenhouse in December, 1948, pricked out in February and planted out in the following July/August on a clear felling of 5·4 ha. in the mountains, on various soils. The plantation was well cared for until 1942, when the war (during which about ½ of the stand was felled) interrupted tending and observation. The trees that were left have survived temperatures down to – 12° C., and are now [1950?] some 30 m. tall and 38 cm. in diameter. The stools of the felled trees have coppiced but in some places the coppice needs freeing from native hardwoods that have come in.

2834. Jovanović, B. Nesamonikla dendroflora Beograda i okoline. [**Exotic tree species of Belgrade and the country round.**] *Glasn. šum. Fak., Beograd* No. 1, 1950 (75–116 + 14 photos). 43 refs. [Serb.f.]

Discusses the soil, climate, and original plant associations of the district, and lists the more important exotic species (35 conifers and 48 broadleaved trees) found there.

2835. **Experimental work and trial plots.** *Rep. For. Dep. Nyasald. 1949*, 1950 (8).

Of the exotic species planted in 1947, *Dalbergia sissoo* is outstanding, averaging 11 ft. 4 in. at 20 months; this is followed by *Albizzia lebbek* averaging 3 ft. 2 in., and *Cupressus torulosa* averaging 3 ft. 6 in., at the same age. An indigenous species, *Rauwolfia natalensis* averaged 8 ft. 5 in. at 20 months. These plots are all on good soil, but the excellent growth of *D. sissoo* and *R. natalensis* in a year of extreme drought is considered very promising, and planting of these species is to be increased.

2836. HELLINGA, G. Houtsoorten voor aanplant op bedrijfsgrootte. **[Tree species for large-scale planting.]** *Meded. Bosbouwproefsta., Bogor* No. 31, 1950. [pp. 50]. 84 refs. [Du.e.jav.] *Repr.* from *Tectona* 40, 1950 (179–229).

Twenty-two species of hardwoods are recommended, as a result of experience in the experimental gardens. [Cf. *For. Abstr.* 12 (No. 242).]

21.1. *Light and Temperature Requirements*

See also *For. Abstr.* 12 (Nos. 2865–6).

2837. WAREING, P. F. **Growth studies in woody species. I. Photoperiodism in first-year seedlings of *Pinus silvestris*. II. Effect of day-length on shoot-growth in *Pinus silvestris* after the first year.** *Physiol. Plant., Copenhagen* 3 (3), 1950 (258–76, 300–14). 17 + 16 refs. [Botany Dept., Bedford College, London.]

I. Under a 10-hour as opposed to a 15-hour photoperiod, first-year seedlings of *Pinus sylvestris* show the following differences: (*a*) the duration of growth is reduced; (*b*) fewer leaves are formed; (*c*) length of internodes and leaves is reduced. No obvious differences in root development were observable, and the relative development of root and shoot was not affected by the day-length conditions. If seedlings are grown under a range of different photoperiods from 10 hours to continuous illumination, the maximum height and leaf number is attained under a 20-hour photoperiod, and with photoperiods greater than this a sharp fall in the leaf-number occurs. It is shown that this latter effect is probably due to the fact that short dark periods (*ca.* 4 hr.) promote a high leaf number whereas long dark periods result in a reduced leaf number. When two 4-hour dark periods are introduced into the 24-hour cycle, the increased leaf numbers produced by each dark period are summated. The effects produced under short-day conditions are considerably reduced when the dark period is interrupted by a short 'light break'. It is shown that a true 'photoperiodic after-effect' occurs when seedlings are transferred from short-day to long-day conditions. The apical meristem and region of internode extension appear to show distinct and independent reactions to the length of the photoperiod.

The interpretation of these results is discussed and the hypothesis is put forward that two mutually antagonistic systems are operative in seedlings of *P. sylvestris* during the dark period: (*a*) a system promoting continued growth of the shoot, which depends upon some substance produced during the preceding light phase and is effective during the first hours of darkness; (*b*) an inhibitor system which becomes operative after 4 hours of dark and results in the earlier cessation of growth in proportion to the length of the dark period.

II. After the first year of growth in *P. sylvestris*, the number of nodes is pre-determined by the number of initials laid down in the buds in the previous year, so that the duration of growth cannot be affected by day-length conditions. Nevertheless the extension of the internodes is affected, being reduced under short-day conditions. It is found that the length of the needles is reduced under short-day conditions, an effect partly due to the fact that the cessation of leaf growth occurs sooner. There is no evidence of direct photoperiodic control of leaf growth under natural conditions in southern England, but this effect is likely to be important in relation to provenance. The effect of day length upon internode extension appears to be direct, and not effected indirectly through the leaves like photoperiodic induction of flowering in herbaceous species. The significance of these results is discussed. *From author's summary.*

21.3. *Soil Requirements. Nutrient Requirements*

See also *For. Abstr.* 12 (Nos. 2572, 2626 *et seq.*, 2652–3).

2838. PURI, G. S., and GUPTA, A. C. **The calcium content of the foliage of Sal and**

its common associates in the Dun valley. *J. Indian bot. Soc.* 29 (3), 1950 (139–44). 12 refs. [Forest Research Institute, Dehra Dun.] O.B.D.

The results of investigations are presented in the form of a table showing ash and CaO contents of leaves of 67 species. These species can be classified into groups based on leaf CaO content and there is evidence that the individual groups, having similar soil mineral requirements, tend to occur on one particular type of substratum. *Shorea robusta* itself has a low leaf CaO content and low-quality trees of this species occur in association with *Pinus longifolia*, *Lagerstroemia parviflora*, *Machilus* sp., *Litsaea chinensis* and *Stereospermum suaveolens* (all of which have a foliar CaO content below 2%) on bouldery soils in the Siwaliks. *Grewia vestita*, *G. oppositifolia*, *Anogeissus latifolia*, *Careya arborea*, *Semecarpus anacardium*, *Kydia calycina* and *Ficus cunia* all contain more than 4% of foliar CaO and form miscellaneous jungles, without Sal, on calcareous conglomerate outcrops on scarp slopes or steep slopes by streams. *A. latifolia*, *Bauhinia retusa*, *Casearia tomentosa*, *Nyctanthes arbor-tristis*, *Cassia fistula*, *Elaeodendron glaucum*, *Eugenia operculata* and *Ougeinia dalbergioides*, all containing between 3 and 4% foliar CaO, form a miscellaneous forest with a low quality and low % of Sal on Maidan hill.

2839. READ, R. A. **Rocks make the trees.** *Sth. Lumberm.* 181 (2273), 1950 (217–9).

The geology of the Arkansas Ozarks is discussed, and a table is given showing the predominant tree species and those best suited to forest management on different geological formations and types of soil.

21.6. *Growth Form. Habit. Behaviour in the Stand. Tree Classes*

See also *For. Abstr.* 12
(Nos. 2848, 3497, 3503–4).

2840. GUILLAUMIN, A. Formes de jeunesse des conifères de Nouvelle-Calédonie—d'après les documents de l'Herbier du Muséum de Paris. [**Juvenile growth forms of the New Caledonian conifers—from evidence in the herbarium of the Paris Museum.**] *Phanérogamie* 14 (1), 1950 (37–43). [F.] O.B.D.

Brief descriptions of the trees, many of which have juvenile forms very different from the adult forms.

2841. **The silvicultural characteristics of young Port Orford White Cedar** [*Chamaecyparis lawsoniana*]. *Rep. Pacif. Nthwest. For. Range Exp. Sta. 1949*, 1950 (29–30).

A study of the species at the Siskiyou-Cascade centre showed that although it makes excellent young growth, it cannot, when in mixture with Douglas Fir and other rapidly growing conifers, maintain a dominant position in the stand beyond 25 years. Heavy deer-browsing aggravates the condition. *C. lawsoniana* in the understorey was found to survive suppression well. Growth declined to a very slow rate but there was excellent response to any release.

2842. NEFF, L. P. **Classifying Black Spruce by tree vigor and dominance can aid the tree marker.** *Tech. Notes Lake St. For. Exp. Sta.* No. 344, 1950. pp. 2. 1 ref.

Graphs are given showing the relationship between crown class (intermediate, co-dominant and dominant) and diameter growth, in stands subjected, 5 years before, to medium or heavy cutting, or left uncut.

21.8. *Phenology*

See also *For. Abstr.* 12
(Nos. 2655, 2670, 2693, 2992–6, 3081, 3459–60).

2843. WETTSTEIN, W. Über Blütenbiologie unserer Waldbäume. [**Biology of flowering in our forest trees.**] *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. [G.] X.

Discusses data on times of flowering of some coniferous trees and of *Tilia platyphyllos*, and their significance in the development of ecotypes. [Cf. *For. Abstr.* 3 (107).]

2844. ROHMEDER, E. Die Vererbung der Austreibezeit bei Fichteneinzelstämmen. [**Inheritance of time of shoot emergence in individual Spruce trees.**] *Forstwiss. Cbl.* 67 (1), 1948 (32–8). 4 refs. [G.g.] (*Mitteilungen, Institut für Forstsamenkunde und Pflanzenzüchtung der Forstlichen Forschungsanstalt, München* No. 16.)

Observations in a Spruce stand in Eichstätt revealed that shoot emergence in a single stand takes place over a period of about 14 days, and that time of shoot emergence (i.e. early or late) tends to be constant in each individual. No difference in growth and yield between trees showing early or late shoot emergence could be established. Experiments were undertaken to find whether this characteristic is hereditary. It was established that a tendency to early or late shoot emergence is definitely inherited from the parent tree (even when wind pollination is involved) though the actual date of emergence cannot be predicted in the progeny. When selecting seed trees, therefore, it is advisable to take into account, not only the growth characteristics of the parent tree, but also time of shoot emergence, late emergence affording some protection against late frosts.

2845. Morrow, R. R. **Periodicity and growth of Sugar Maple surface layer roots.** *J. For.* 48 (12), 1950 (875–81). 8 refs.

Root growth of *Acer saccharum* was measured in 1947–49 in young stands on two different sites in New York state. The roots grew throughout a mild winter. Root growth was continuous throughout the year on a deep, coarse mull soil, but early autumn drought halted it on a poor, shallow soil. Length growth occurred mainly in the spring, growth at other seasons consisting mainly of formation of many new root tips. Since there was much spring growth and little autumn growth, in spite of similar soil conditions, it was concluded that Sugar Maple roots grow according to an inherent growth pattern, which in turn is influenced by environmental factors.No correlation was found between shoot growth, cambial activity, leaf activity, and root growth, except that the period of maximum growth occurred in the spring in all cases. Mycorrhizae were found on 95%, and root hairs on 75% of all roots examined.

2846. **[Growth periods of N. Queensland species.]** *Rep. Qd. For. Serv. 1949–50*, 1950 (18).

Reports on Silver Ash [*Flindersia pubescens*] and Yellow Walnut [*Beilschmiedia bancroftii*] from N. Queensland, indicate that within any one year there is a period of active growth and one of dormancy, the dormant period coinciding with periods of high rainfall and high temperatures.

22. SILVICULTURAL SYSTEMS.
FORMS OF STAND

22.1. *High Forest Forms*

See also *For. Abstr.* 12 (Nos. 2860–3).

2847. Lositski, K. B. Glavnŷe rubki v gornŷkh lesakh. **[Principal fellings in the montane forests [of Transcarpathia].]** *Lesn. Khoz.* 1950 (2), (28–32). [Russ.]

The choice of silvicultural systems for the montane production forests of the Transcarpathian region of the Ukraine is governed by the need for preventing erosion and maintaining their water-regulating functions. The forests discussed are: (1) Oak forests of the plain, in which successful regeneration can be obtained under shelterwood, the old stand being removed in 2–3 successive fellings. (2) Oak/Beech forests of the foothills up to 300 m. above sea level. Here the same system can be applied, but the old stand should be removed in 3–4 fellings to lessen the risk of windthrow of the parent crop and frost damage to reproduction. Beech tends to replace Oak and should be cut first in order to give the Oak a chance. (3) Beech forest between 300 and 1,100 m. Up to gradients of *ca.* 30° clear felling gives good results; the maximum area of a coupe should be 30 ha. on slopes of 10° or less on northerly aspects, and smaller on steeper slopes or southerly aspects. On gradients between 30 and 45° the method should be 3–4 shelterwood fellings. (4) Mixed Beech/conifers (Spruce and Fir): clear fellings on slopes of up to 30°; group selection fellings between 30 and 40°; maximum felling areas to be intermediate between those in (3) and (5). (5) Spruce and Spruce/Fir forests at 1,000–1,600 m.: as (4); but maximum area of a clear felling should be 200 ha. in a strip 200 m. wide for northerly slopes not exceeding 10° (less on steeper and southerly slopes) and 3–5 years must elapse before felling is done on an adjacent strip; openings in group selection not to exceed ½ of the stand height in diameter and 200–300 sq. m. in area. A table is given to show for conifer stands the permissible width and area of clear fellings according to gradient (10° intervals between 0. and 30°) and aspect. The conventional recommendations are made about the directions of advance of fellings against that of prevailing winds, the desirability of running

strips contourwise and of using cable methods of extraction where possible.

2848. MOWAT, E. L. **Preliminary guides for the management of Lodgepole Pine in Oregon and Washington.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 54, 1949. pp. 10. 6 refs.

Immature stands of *Pinus contorta* var. *latifolia* responded favourably to moderate thinning. In mature or uneven-aged stands, accelerated growth of residual trees followed the removal of larger trees.

Studies were made on 4 fairly well stocked areas of medium site quality after commercial fellings had been made. The fellings did little or nothing to improve the health and quality of the stands. Mistletoe and canker were common in trees of all sizes. The residual stand was estimated at: pole trees 33%, sawlog trees 43%, rough trees of doubtful merchantable value 17% and cull trees 7%. The stands were growing at a rate of 27–53 cu. ft. a year, a rate near to, and in two cases exceeding, that of the stands before felling. There were large and significant differences between growth rates of trees in 4 crown vigour classes. Some suggestions for management of stands are made.

22.2. *Coppice Forest*

See also *For. Abstr.* 12 (Nos. 2853, 3519).

2849. Service forestier du Soudan: rapport pour l'année 1949. **[Annual report of the forest service of French Sudan for 1949.]** *Bois For. Trop.* 15, 1950 (294–5). [F.]

In the Sahelian zone, where annual precipitation averages 300 mm., the forest consists mainly of *Balanites aegyptiaca*, *Acacia* spp. and *Diospyros mespiliformis*. Experiments were made to test the coppicing power of these species. *D. mespiliformis* coppiced readily, particularly if cut before the rains; *A. stenocarpa* coppiced only when cut before the rains; height and diameter of stump are immaterial. *A. tortilis* of less than 25 cm. diameter coppiced if cut before the rains. *A. arabica* did not coppice at all. *B. aegyptiaca* coppiced weakly and slowly. It is concluded that only *D. mespiliformis* and *A. stenocarpa* should be exploited for fuel.

2850. BADOUX, E. Notes sur un taillis fureté de hêtre. **[Notes on a selectively managed Beech coppice.]** *Schweiz. Z Forstw.* 101 (7/8), 1950 (333–42 + 3 photos). 7 refs. [F.g.]

Data on increment and yield derived from a sample plot in a Beech forest near Montreux, managed selectively as coppice. Selective felling is done every 8–10 years, the largest stems being taken out irrespective of age. Production is high (4½ cu.m. of small wood or 7 cu.m. total volume/ha./year), and the system is well suited to the character of Beech, which does not coppice readily and needs protection from snow, frost, excessive insolation etc.

2851. GILL, W. **Notes on pollarding trees.** *Bull. Wds. For. Dep. S. Aust.* No. 2, 1950. pp. 7. *Repr.* from *Journal of Agriculture of South Australia* Aug. & Oct., 1903.

22.8. *Forms of Stand (Pure Stands, Mixtures etc.)*

See also *For. Abstr.* 12 (Nos. 2856, 2864–5, 2928).

2852. TIKKA, P. S. Perä-Pohjolan kuusikoiden laadusta. **[The character of the Spruce stands in northern North-Finland.]** *Acta for. fenn.* 55 (1), 1948. pp. 64. 74 refs. [Fi.g.]

Report on a study of 52 sample plots (41 pure Spruce and the rest a mixture of Spruce, Pine and Birch). Deals with ground-vegetation types, stand structure, branchiness, stem form, defects, and the possibility of improving these stands. Tables and graphs have legends in German as well as Finnish and there is a 5-page German summary.

2853. SUBER, E. Untersuchungen an Mittelwaldfichten im nordostschweizerischen Laubmischwaldgebiet. **[Spruce originating in coppice with standards in the mixed broadleaved forest region of N.E. Switzerland.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 26 (2), 1950 (635–81). [G.g.f.]

The mixed broadleaved forest of the Swiss plateau often includes high-quality Spruce of good form which originated in the reserve stand of coppice with standards. Study and measurement of a number of these trees incline the author to believe that they occurred spontaneously and belong to a variety of races, and that their superior form is due to the beneficial conditions in which they have grown.

Analysis of growth rings on stumps revealed a period of check in the early years, an immediate reaction to periodic release, and regular, rapid growth even at an advanced age, which testify to the ability of Spruce to tolerate shade for long periods and react quickly to liberation. The possibility of introducing a proportion of Spruce into broadleaved forests is discussed.

23. FORMATION OF STANDS

23.1. *Natural Regeneration*

See also *For. Abstr.* 12 (Nos. 3099, 3359).

2854. Li, L. Y., Li, C. S., and Yang, N. C. **The natural reproduction of some important forest species in Fukien.** *Fukien agric. J.* 11 (3/4), 1950 (169–77). 6 refs. [Chin.e.]

Observations made on a number of sample plots indicate that *Cunninghamia lanceolata*, *Keteleeria fortunei*, and *Liquidambar formosana* regenerate satisfactorily from seed trees.

2855. Mirams, R. V., and Chapman, V. T. **Natural regeneration in the Kauri.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. X.

Regeneration of Kauri [*Agathis australis*] is high under Tea Tree scrub and poorest under mature Kauri stands. It seems likely therefore that Kauri may not be able to regenerate on the same site. An analysis of cone production and seed content shows that there is adequate sound seed for natural regeneration, but its viability is low. Germination is affected by the high humidity of the natural habitat, light intensity, mode of insertion of the seed into the soil and also by insect depredations.

2856. Susmel, L. Temperamento e rinnovazione dell'abete bianco. [**The silvicultural characters and regeneration of *Abies alba.***] *Monti e Boschi* 2 (2), 1951 (63–6). [It.f.e.]

After reviewing the light, temperature, and moisture requirements of *A. alba*, the author concludes that the lack of regeneration in pure stands of that species is not due to deficiency of any or all those factors, and suggests that it may be caused by a disequilibrium between species of symbiotic soil micro-organisms, which does not occur under mixed stands.

2857. McCullough, H. A. **Preliminary comparison of tree mycorrhizae on fallen logs and on the forest floor.** *Abstr.* in *Journal of the Tennessee Academy of Science, Nashville* 25 (3), 1950 (224). (*Proceedings of the Eleventh Annual Meeting of the Association of Southeastern Biologists.*) L.S.

Mycorrhizae were found in roots of *Picea engelmanni* and *Abies lasiocarpa* growing on fallen logs, as well as in those of the same species growing on the forest floor. The presence of mycorrhizae therefore is not a factor in the preference of Spruce and Fir for fallen logs as seedbeds. [Cf. *For. Abstr.* 11 (No. 986).]

2858. **Effect of backfires and headfires on Longleaf seedlings.** *Res. News Stheast. For. Exp. Sta.* No. 12, 1950 ([3]).

In a test of the relative effects of backfires and headfires on Longleaf Pine seedlings, 5 pairs of plots were selected and one of each pair was burned with a headfire and the other with a backfire. The seedlings were about 3 years old with root collars ranging from 0·2 to 0·3 in. in diameter. In plots burned by backfires 57% of seedlings died. In those burned by headfires 35% died.

2859. Bruce, D. **Fire, site, and Longleaf height growth.** *J. For.* 49 (1), 1951 (25–8).

In a test started in S. Mississippi in 1935, light and severe fires in 4-year-old Longleaf Pine regeneration caused no more mortality in the following 4 years than occurred on unburned plots. Both summer and winter fires, however, killed 46% and 26% respectively of trees in 9-year-old plots. Light fire when the seedlings were 4 years old stimulated height growth, probably by controlling brown-spot disease. Summer fires were more beneficial than winter ones. In another study on poorer soils in north Florida, it was found that the more frequent and more severe the fires, the lower the survival and the poorer the height growth. The best growth there was on unburned plots. Local differences in soil conditions had more influence on height growth than the fire treatments. No evidence was found that fire in open grassy areas altered the soil in any way.

2860. Trousdell, K. B. **Seed and seedbed requirements to regenerate Loblolly Pine.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 8, 1950. pp. 13. 7 refs.

Figures for the Bigwoods Experimental Forest are given in graphs and tables to show the number of seedlings produced from various amounts of sound seed on 4 classes of seedbed (slash, undisturbed, burned, and disturbed mineral soil), the relation between one-year-old seedlings per acre and % stocking on a uniform seedbed, and sound seed per tree by seed year and cutting history. The seed supply needed to produce adequate stocking on a disturbed seedbed in Bigwoods soil conditions is estimated to range from 20,000 to 37,000/acre. The minimum and maximum numbers of 20-in. d.b.h. seed trees to produce these amounts in the seed years 1946 and 1949 are shown for unreleased trees and trees stimulated by release. These data, and the other few records available, indicate that seed from an uncut stand will be inadequate, but that release of the seed trees by partial cutting is likely to give good seed production 3–4 years later. [Cf. *For. Abstr.* 11 (Nos. 989, 994).]

2861. TIRÉN, L. Om den naturliga föryngringen på obrända hyggen i norrländsk granskog. **[Natural regeneration in unburnt felling areas in the Spruce forests of Norrland.]** *Medd. SkogsforsknInst., Stockh.* 38 (9), 1949. pp. 210. 98 refs. [Sw.e.]

The method of the investigation is described in detail and results are tabulated. An average spacing of 2 m. is considered to be the maximum for regeneration of Spruce and Pine to be regarded as satisfactory. At 100 m. above sea level, with 10 seed trees per ha., satisfactory regeneration was obtained in less than 10 years. At 150 m., with 30 seed trees, regeneration time was 10 years, and with 10 trees per ha., 17 years. At 200 m., with 30 trees, satisfactory regeneration was obtained after 17 years, and with 50 trees, after 13 years; with only 10 seed trees per ha., regeneration was still unsatisfactory after 30 years. At 300 m., with 50 trees per ha., a spacing between new crop trees of about 2·1 m., which cannot be considered satisfactory, was obtained after 20 years. At 350 m., 30 seed trees per ha., gave, after 20 years, spacings of 2·5 m. There is a very full English summary, and legends to tables, graphs and illustrations are in both English and Swedish.

2862. SARVAS, R. Siemenpuuhakkuu männikön uudistushakkuuna etelä-suomessa. **[Seed-tree cutting as a regeneration method in Scots Pine forests of Southern Finland.]** *Commun. Inst. for. Fenn.* 37 (5), 1949. pp. 43. 37 refs. [Fi.e.]

A survey was made, by the stocked-quadrat method, in sample plots on 30 regeneration areas which had been subjected to seed-tree fellings at least 10 years before. The number of seed trees varied from 12 to 180/ha. As a preliminary, m.a.i. of seed trees was measured; this averaged 0·6 cu.m./ha. on *Calluna*-type (CT) areas, 0·9 cu.m./ha. on *Vaccinium* type (VT) and 1·3 cu.m./ha. on *Myrtillus* type (MT). The quantity of the seed crop was estimated both by number of fallen cones/quadrat and from seed traps. It was found that the average annual crop from seed-tree stands in CT areas was 18·5, and in VT areas 49·2 seeds/sq. m. or 0·64 and 1·7 kg./ha. respectively (cleaned but unsorted seed). As there is no essential difference in the trees on the two types, it is evident that sites with a poor growth rate also produce smaller seed crops than those with a higher growth rate.

The average number of seedlings in both CT and VT areas was *ca.* 13,000/ha., compared with 4,000/ha. deemed necessary for adequate stocking. But when the frequency figure was taken into consideration, it was found that more than half the seedling stands in CT, $\frac{2}{3}$ of those in VT areas and all in MT areas were unsatisfactory (frequency figure below 40%).

The legends to photographs and tables are given in English as well as Finnish.

2863. POLANSKÝ, B. Niektoré spôsoby prirodzenej obnovy lesov vhodné pre Slovensko. **[Some methods of natural generation suitable for Slovak forests.]** *Pol'ana* 6 (9/10), [1950] (201–4). [Slovak.]

Some account of the author's suggestions, based on pre-war study, with specific and detailed recommendations for the Malachy (mainly Pine) and Bohunice (Oak and Beech) regions.

2864. HUMMEL, F. C. **The silviculture of mixtures in the forests of Salem, Zeil and Mengen.** *Quart. J. For.* 45 (1), 1951 (23–9).

The general policy in these forests, among the best managed woodlands in south-western Germany, is to grow conifers and broadleaved species in mixture. The somewhat unusual methods of silviculture and management are described, and the possibility of applying these

methods under British conditions is discussed. Salem forest was never converted to pure Spruce, as were most of the forests in that part of Germany, but has been maintained as a more or less even-aged mixture of conifer and broadleaved species in the ratio 6 : 4. The young crops are very dense and consist of naturally regenerated Spruce, Beech, Larch and Pine. Even small gaps are beaten up with seedlings of Larch and other fast-growing light-demanders, usually taken from places where the regeneration is too dense. Tending operations (release from over-crowding, removal of wolf trees, and crown pruning) begin almost as soon as the beating up has finished and are repeated at frequent intervals, but the crop is kept dense, except for the Larches, which generally occur singly and are given ample space for crown development from the beginning. These tending operations gradually give way to thinnings, which aim at regulating the mixture so that most of the Spruce can be removed at *ca.* 80 years, leaving a complete growing stock of the other species which are not felled until they are 120 or more years old. Interest in regeneration is shown, and regeneration fellings start, only when the crop is mature. At this stage Beech regeneration is usually cut back, as it tends to be of bad shape and to interfere with other species. Gaps in the natural regeneration are filled with fast-growing light-demanders, particularly Larch. Management is based on the *méthode du contrôle*.

The forests of Zeil and Mengen were converted to pure Spruce in the nineteenth century, but during the past 40 years the object of management has been to convert them to mixed even-aged forests of the Salem type. At Zeil, special measures have been taken to avert formation of raw humus and restore soil fertility by the application of fertilizers and sowing of soil-improving species such as Broom, lupin and foxglove. An unusual feature is the size of plants artificially introduced. Beech and other broadleaved species are often transplanted when 4–6 ft. high; but it is necessary to prune both roots and crowns of such large plants and to stake them.

2865. Silvy-Leligois, P. Le forestier entre l'ombre et la lumière. **[The forester between shade and light.]** *Schweiz. Z. Forstw.* 101 (6), 1950 (259–77). 18 refs. [F.g.]

The author's thesis, illustrated by examples from north and east France, is that, from the earliest historical age until the end of the eighteenth century, human intervention in the forests of western Europe was all in the direction of opening up and clearing, and favoured the light-demanding species which are generally the most valuable. Since the beginning of the nineteenth century, on the contrary, silvicultural methods have tended towards the establishment and maintenance of a close canopy, with the result that, if left to itself, regeneration becomes restricted to shade-bearers, which first come to form the understorey and eventually, as the light-demanding dominants disappear, dominate the whole stand. The prime task of the forester at the present time is to interrupt this development and ensure the persistence of the valuable species. The various methods to be employed in order to maintain Oak, Pine, Larch and Spruce are discussed in some detail. For the first two of these species, the essential measure is to remove the shade-tolerant species of the understorey before regeneration or final fellings are made. Spruce and Larch present a more difficult problem, since it is necessary to have an intermediate period between two rotations, in which the soil may be restored by broadleaved species or by fallow or (in the case of Larch) by pasture.

2866. Dineur, P. Quelques données sur l'écologie de la régénération du chêne rouvre. **[Some data on the ecology of *Quercus sessiliflora* regeneration.]** *Bull. Soc. for. Belg.* 58 (2), 1951 (38–50 + 4 photos). [F.]

Measurements of light under various degrees of canopy closure were made at the level of seedling regeneration of *Q. sessiliflora* using a photometer of photo-electric cell type. It was found that reproduction can take place and persist for a year or two even under thick coppice growth where the relative illumination (RI) is less than 1%, but that the lack of light soon produces etiolation. The following observations were made:—*RI below 10%*: only very young seedlings can flourish; later they become spindly, stagnate, or disappear. *RI 10–20%*: satisfactory for seedlings of 1–5 years; growth slows down in older plants. *RI 20–30%*: plants 1–5 years old flourish; those of 5–10 years grow satisfactorily. *RI 30–40%*: appears to be optimum condition for plants 5–10 years old; those of 10–15 do well. *RI*

above 40%: optimum for trees of more than 10 years.

The greater part of light-interception was found to be due to coppice growth, even when the Oak overstorey was dense, and it is recommended that the first silvicultural operation should consist in releasing seedlings from ground cover and coppice growth. The overstorey of Oak should be left standing as long as it does not retard growth of the young stand, and should finally be removed in one or two secondary fellings. [Cf. *For. Abstr.* 11 (Nos. 838, 966).]

2867. Brown, G. S. **Note on recovery of lowland dipterocarp forest from winch logging in North Borneo.** *Malay. Forester* 13 (4), 1950 (230–1).

Recent enumeration surveys were made on an area logged in 1928 by high lead to steam winches, not much merchantable timber being left standing. Regeneration is well and evenly distributed over the area, Serayas (*Parashorea* spp.) and Kapur (*Dryobalanops*) being the commonest spp. In 1928 the volume loaded at the yarders averaged 1,062 cu. ft./acre, and the present (i.e. after 21 years) merchantable volume standing on the same area is 450 cu. ft./acre. No improvement fellings or cultural operations have been done in this forest. It seems that, in the absence of clear felling and fire, its powers of recovery are remarkable, and that appearances immediately after logging operations may be misleading.

2868. Serevo, T. S. **Silvicultural observations in the cut-over areas of the Nasipit Lumber Company in Agusan.** *Filipino For.* 2, 1950 (29–50). 9 refs.

Observations were made on the effect of logging on regeneration of an overmature dipterocarp forest with sparse advance growth. In such forest it is impossible to remove the main stand without practically destroying the understorey. The removal of the main stand means the removal of almost the whole canopy, which results in the death of almost all seedlings and many of the small poles. Development of second-growth forest usually begins with the establishment of a species of wild Banana which is quickly followed either by Bamboo (*Schizostachyum mucronatum*) or tree species—*Endospermum peltatum*, *Commersonia bartramia*, *Mallotus ricinoides*, and *Trema orientalis*. The area is invaded later by trees characteristic of the second storey in Dipterocarp forest, e.g. *Aglaia diffusa*, *Myristica simiarum*, *Nephelium mutabile*, *Dillenia philippinensis*, *Notaphoebe malabanga*, *Celtis luzonica* etc. These appear to serve successfully as nurse crops to such of the shade-tolerant Dipterocarp reproduction as exists. It is emphasized that this second-growth forest is essentially seral in character; the species composing it are light-demanders which will not regenerate under canopy, and exploitation (e.g. for pulp production) would result only in invasion by *Imperata cylindrica*. It is concluded that the most practical way of re-stocking cut-over areas is by planting relatively quick-growing commercial species such as Mahogany [*Swietenia macrophylla*] or Nana [*Pterocarpus* spp.] where reproduction of commercial species is lacking, and to protect the area so as to allow the dipterocarps to develop to maturity. The dangers of mechanical logging in tropical forest are pointed out. Areas round spar trees, loading booms, and log landings, etc., were found to be practically bare of vegetation even two years after logging. In high-lead yarding it is estimated that about $\frac{2}{3}$ of the yarding distance round the spar tree is devoid of vegetation, and in caterpillar skidding, about 25 m. round the log landing and loading boom is equally bare. In a donkey-logged area of 20 ha. about $\frac{3}{5}$ was completely bare. The topsoil on such areas has either been scraped off or so compacted that plant growth is absent or very slow.

23.2. *Artificial Regeneration*

2869. Guigonis, G. Les possibilités de sylviculture intensive de l'okoumé au Gabon. [**The possibility of intensive silviculture of *Aucoumea klaineana* in Gabon.**] *Proc. World For. Congr.* No. 3, 1950 (26–37). [F.]

Compares the merits of planting and of strip-sowing. [Cf. *For. Abstr.* 10 (No. 191).]

23.21. Choice of Species

See *For. Abstr.* 12 (Nos. 2836, 2839, 2923, 2998).

2870. Keller, J. Wirtschaftliche Gesichtspunkte zur Holzartenwahl. [**Economic considerations in the choice of species.**]

Schweiz. Z. Forstw. 101 (9), 1950 (453–9). [G.f.]

With reference to Switzerland.

2871. RICHARD, F. Bodenkundliche Bemerkungen zur Holzartenwahl. **[Pedological considerations in the choice of species.]** *Schweiz. Z. Forstw.* 101 (9), 1950 (459–68). [G.f.]

With reference to Switzerland.

2872. LAMPRECHT, H. Waldbauliche Gesichtspunkte zur Holzartenwahl. **[Silvicultural considerations in the choice of species.]** *Schweiz. Z. Forstw.* 101 (9), 1950 (468–73). [G.f.]

With reference to Switzerland.

2873. GÉZA, S. Cser helyett fenyöt. **[Conifers instead of *Quercus cerris*.]** *Erdész. Lap.* 86 (1), 1950 (12–5). 6 refs. [Hu.russ.f.e.]

In view of the low productivity and poor timber quality of *Q. cerris* in Hungary the author urges its replacement by conifers, particularly *Pinus sylvestris*, *P. nigra* and *P. strobus* because of their resin potentialities.

2874. MARRERO, J. **Results of forest planting in the Insular forests of Puerto Rico.** *Carib. For.* 11 (3), 1950 (107–47). 14 refs. [E.] [Tropical Forest Experiment Station, Rio Piedras.]

Presents the results of an investigation into past forest plantings in the Insular (as opposed to Federal) forests in order to obtain some guidance in planning future work. Nine forest areas are described from the ecological standpoint, and the site factors in each are studied, with the species planted and the techniques used in different plantations. Success obtained with various species is noted and the species themselves are classified into 3 broad survival classes. A tabulated summary is presented of the adaptability of species, factors responsible for losses are studied, and principles to be followed in future work are briefly stated.

2875. STOECKELER, J. H., and LIMSTROM, G. A. **Reforestation research findings in northern Wisconsin and upper Michigan.** *Sta. Pap. Lake St. For. Exp. Sta.* No. 23, 1950. pp. 34. 9 refs.

Experimental plantings made between 1937 and 1942 on the Nicolet and Chequamegon National Forests in northern Wisconsin have provided valuable data on choice of species, their silvicultural requirements, survival, growth rate, shade tolerance, resistance to drought and exposure, damage by animals, insects and competing vegetation and other factors affecting the early life of the plantations. The results are presented, and specific recommendations are made for the localities in question.

23.22. Preparatory Work. Auxiliary Measures

See also *For. Abstr.* 12 (Nos. 2922, 2952–4).

2876. CALLIN, G. Redogörelse för några markberedningsförsök med häst- och maskindragna redskap. **[Report on some experiments on soil scarification using horse- and tractor-drawn implements.]** *Medd. SkogsforsknInst., Stockh.* 38 (1), 1949. pp. 38. [Sw.sw.e.]

Horse-drawn implements used in the experiments were: Berg's cultivator 2/1947 [cf. *For. Abstr.* 11 (No. 232)], Sjöström's forest harrow, and the 'Jämten' and Widén forest ploughs [cf. *For. Abstr.* 8 (No. 208)]. The actual working time per 1,000 standard areas (each 35 × 35 cm.) of rough forest ground averaged 4 man-hr., and ranged from 2·5 to 7·0 hr. according to the implements used. Horse time was rated as equal to man time. The average cost at 1948 labour rates was *Kr.*14 per 1,000 standard areas. The figures are compared with those for hand cultivation; the use of horses reduced the cost by an average of 28% and for Berg's cultivator and Sjöström's harrow by nearly 50%. The work is, however, very tiring for the horse, and rest periods must be allowed. Experiments using 4 types of tractor were made with Sjöström's 'Skogssesam' [cf. *For. Abstr.* 8 (No. 2381)], Andersson's scarifier [cf. *For. Abstr.* 11 (No. 231)], Mathiasson's 'Slagjbörn' and Berg's cultivator [cf. *For. Abstr.* 11 (No. 1759)]. The 'Skogssesam' and the scarifier, used singly, averaged 1·25 tractor-hr. per 1,000 standard areas. The 'Slagbjörn' and the cultivator, used 2 abreast, averaged 0·57 tractor-hr. The cost for the horse- and tractor-drawn implements giving the best results was about the same.

2877. FIXMER, F. N. **Experiment in mechanical elimination of Scrub Oak.** *Pulp Paper Mag. Can.* 51 (13), 1950 (118).

(*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1108 (*F*–2).)

A caterpillar D-6 equipped with a Fleco Root Rake was used to eliminate Scrub Oak. On 13 acres a 10-ft. swath was raked in one direction only, alternate 10-ft. strips being left undisturbed; on 12 acres the 10-ft. swaths were raked in both directions. The cleared swaths were hand-planted with Jack Pine in the following spring. Figures are given to show the effect of the rakings in eliminating Scrub Oak, actual costs of raking and planting, and the estimated gross cost of establishment at the end of the first rotation of 40 years. The final cost per cord of pulpwood is estimated at $5.86, but this may be reduced with increasing operational experience and by mechanical planting.

2878. COLDWELL, T., and PECHANEC, J. F. **The Brushland Plow.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 64, 1950. pp. 7.

Describes, with illustrations, a plough developed for killing Sagebrush and other undesirable shrubby plants on range lands before reseeding.

23.23. Seed and Sowings

23.23.1. *Seed Production, Procurement, Treatment and Testing*

See also *For. Abstr.* 12 (Nos. 2666, 2682 *et seq.*, 2824, 2860–2).

2879. TYSZKIEWICZ, S. Saatgut- und Pflanzenbeschaffung in Polen. **[The production of forest tree seed and planting stock in Poland.]** *Schweiz. Z. Forstw.* 101 (6), 1950 (282–95). [G.f.]

Cf. *For. Abstr.* 11 (No. 2629).

2880. POURTET, J. La réglementation du commerce des semences et plantes forestiers. **[The regulation of the trade in forest seed and planting stock.]** *Rev. for. franç.* No. 2, 1951 (96–102). 3 refs. [F.]

Discusses a recent decree of the French Minister of Agriculture, annexed to which is a list of species, varieties, and hybrids of trees. Only trees that appear in this list may be sold as forest or hedge species ['essences forestières et d'alignement'], or advertised as such in trade catalogues or circulars. Seeds and plants offered for sale must be described by both botanical and common name, and the place of origin must be stated. Exotic species which have proved unsatisfactory (e.g. *Pseudotsuga taxifolia* var. *glauca*), indigenous species which regenerate themselves all too easily (e.g. *Carpinus betulus*), and species highly susceptible to disease (e.g. *Ulmus* spp.), are excluded from the list. The regulations cover all the usual points of purity, healthiness etc.

2881. **[The size of seed traps.]** *Rep. Pacif. Nthwest. For. Range Exp. Sta. 1949*, 1950 (34).

A study was made of seed traps ranging in size from 1 to 16 sq. ft. A large number of smaller traps are easier to handle and may give a better estimate of sampling accuracy. However, setting a large number of traps is inconvenient, small traps may be difficult to find, and when seed crops are light, seeds fall into relatively few of the small traps and the work of finding and examining blanks is wasted. A new trap, 2 × 3 ft., was constructed; this should be large enough to receive one or more seeds in a normal seed fall, and small enough to be easily portable.

2882. KARSCHON, R. Über den Hohlkornanteil bei Föhrensaatgut autochthoner Populationen. **[The proportion of hollow seed in indigenous [Swiss] Pine stands.]** *Schweiz. Z. Forstw.* 101 (6), 1950 (295–6). 3 refs. [G.]

The % of hollow seed in the seed produced by 60 trees in 14 Pine stands at altitudes between 385 and 1770 m. was ascertained, and the data analysed statistically. It was found that the difference in this respect between trees in a stand was much greater than that between different stands, and it is concluded that the % of hollow seed produced is an idiosyncracy of individuals, which should be taken into account when selecting seedbearers. The lighter colour of hollow seed makes selection easy.

2883. ADAMS, J. S. **Pine seed production and collection in the south-east of South Australia.** *Aust. For.* 14 (1), 1950 (30–8). 3 refs.

Pinus radiata, *P. canariensis*, and *P. pinaster* are dealt with. The procedures used in S. Australia for collection, extraction and storage of seed are described, and the choice of seedbearers is discussed.

2884. **[Best time for collection of Douglas Fir cones.]** *Rep. B.C. For. Serv. 1949*, 1950 (25).

In this study, tests were also made to see if there was any connexion between the specific gravity of the developing cones and the germinative capacity of the seed. It was shown that by the end of the first week in August the seeds were capable of germination, but cones did not float in water until 6–13 September.

2885. Soom, E. Verbesserung am Baumvelo. **[Improvements in the 'tree bicycle'.]** *Schweiz. Z. Forstw.* 101 (10/11), 1950 (590–1). [G.]

Cf. *For. Abstr.* 11 (No. 2661).

2886. Huss, E. Om avvingningsskador på skogsfrö. **[Damage to seeds by de-winging.]** *Medd. SkogsforsknInst., Stockh.* 39 (3), 1950. pp. 56. 11 refs. [Sw.e.] Price *Kr.*1.

In laboratory experiments, germination capacity of Pine and Spruce seeds was found to decrease and in some cases to disappear after a short de-winging period. It decreased more rapidly when de-winging was carried out at a greater speed. Seeds were protected from damage to some extent when the wing residue was left with them in the machine. The germination capacity seemed to decrease more rapidly at the beginning than at the end of the process. Germination capacity of red clover seeds subjected to the same treatment also decreased. Treatment in a centrifugal machine (3–4,000 revs./min.) did not affect the germination capacity of seeds. When Pine seeds were dropped repeatedly from a height of 10 cm. over a period of 12–24 hr. and when Pine cones containing seed were subjected to heavy blows, germination capacity decreased. Simple surface wounds were not the cause of the decreases and no damage to embryos or endosperms was found: it is possible that some chemical change is responsible. Preliminary sowing experiments showed that roughly handled seeds gave weaker plants. All types of de-winging machine tested did some damage to the seeds. Further sowing experiments showed that the plant % for seeds de-winged by hand was higher than for those treated mechanically and remained constant. The plant % for seeds de-winged mechanically decreased with increasingly severe treatment. It is estimated that 10–20% of the yearly seed harvest is destroyed by de-winging.

2887. Tabellarisch overzicht van de beste kiem-, bewaar- en verzendingswijze van zaad van een aantal boomsoorten en groenbemesters. **[Tabular review of the best methods of germination, storage and despatch of seed from a number of trees and green-manure plants.]** *Rapp. Bosbouwproefsta., Bogor* No. 42, 1950. pp. 23. [Jav.du.]

The table, which is in Javanese with a Dutch glossary, gives data for storage conditions, pretreatment, the time taken for germination to begin and to reach 80%, the germination % and plant %, for nearly 200 species. Conditions similar to those for storage are recommended for sending seeds over long distances.

2888. Kjaer, A. **Storage of *Larix* seeds.** *Proceedings of the International Seed Testing Association, Copenhagen* 16 (1), 1950 (95–7). L.S.

Experiments at the Danish State Seed-Testing Station, Copenhagen, showed that seeds of *Larix decidua* may be stored for 7 years without loss of viability, if dried to *ca.* 8% moisture content and kept air-tight. In a climate like Denmark's, storage can be in an unheated room, fairly well insulated, but not necessarily kept at a constant temperature. *From author's summary.*

2889. David, R. L'activation de la germination des graines de pin maritime. **[Stimulation of germination in *Pinus pinaster* seed.]** *Bois & Résin.* 32 (1551), 1951 (1). [F.] [Service de Biologie forestière de l'Institut du Pin, Bordeaux.]

Studies in the germination of *P. pinaster* seed showed that while the fat content of the endosperm is progressively impoverished, that of the embryo varies little. The molecules of fatty acids are always smaller in the embryo than in the endosperm. The fats are not evenly distributed in the embryo; the most rapidly growing parts (root, base of stem, and rudimentary cotyledons) have least.

As a result of some thousands of germination tests it is concluded that both germinative capacity and germinative energy vary in the same lot of seed in the course of the year, being at a maximum in April and May and at a minimum in November and December. Since all the tests were carried out in the dark at the

same even temperature and atmospheric humidity, it is clear that the seasonal variations in germinative power (45–85%) cannot be due to external factors, and that there must exist in *P. pinaster* seed an inherent seasonal rhythm. These results explain the considerable differences in germinative power in a given lot of seed during earlier experiments in chemical stimulation of germination. All the usual forms of treatment were tried, and the most satisfactory was found to be storage at + 2° C. after preliminary soaking for 5–10 days at laboratory temperature. Storage in this way for 51 days gave 50% germination after 7 days, compared with 1–4% for controls. Longer cold storage (138 days) gave 80% germination in 7 days. Treatment with various growth-regulating substances, heat, ultra-violet radiation, and artificial light, had very little effect.

2890. **Pre-germination treatment of Hoop Pine seed with 'Ceresan'.** *Rep. Qd. For. Serv. 1949–50*, 1950 (7).

Large-scale experiments in the dusting of Hoop Pine (*Araucaria cunninghamii*) seed with 'Ceresan', a proprietary compound in which the active agent is an organic Hg compound, confirmed the results of previous experiments, that this treatment gives a 25% increase in germination. Ceresan dusting at the rate of 1– lb./100 lb. of seed is now a matter of routine for Hoop Pine seed. Further work is being done to determine the most efficient application and to find out whether treatment of seed before cold storage will still be effective after several years.

2891. LEIBUNDGUT, H. Beitrag zur Anwendung synthetischer Wuchsstoffe im Waldbau. **[The use of synthetic growth substances in forestry.]** *Schweiz. Z. Forstw.* 101 (10/11), 1950 (570–4). 4 refs. [G.f.]

Treatment of conifer seed, chiefly European and Japanese Larch, with synthetic auxin (Roche 202) gave very different plant % and root/shoot development for different provenances and for seed of different ages. Results are tabulated.

2892. BULARD, C. Accélération et amélioration de la germination par l'action de l'hétéroauxine chez *Picea excelsa*. **[The acceleration and improvement in germination of Spruce seed treated with heteroauxin.]** *Trav. Lab. for. Toulouse* 1 (5) Art. 2, 1950. pp. 6. [F.]

Treatment of fresh, 1- and 2-year-old Spruce seed with strong doses (1–100 mg./l.) of heteroauxin greatly hastened the germination of seed of all ages and gave a much higher germination % for the 2-year-old seed (55–60% compared with 36% for controls).

2893. LI, C. S., CHANG, P. L., and YANG, S. L. **The effect of stratification and other treatments on germination and establishment of Chinese Olive [*Canarium album, C. pimela*] seeds.** *Fukien agric. J.* 11 (3/4), 1950 (149–56). 6 refs. [Chin.e.]

Stratification in moist sphagnum moss or river sand for 50–60 days in the natural winter temperature of Foochow, gave the best germination and establishment. Seeds treated with H_2SO_4 or hot water germinated 2–3 weeks earlier than stratified seed in the spring, but by the end of the summer, seedlings from stratified seed were taller and more vigorous.

2894. **[Testing the viability of seed of *Pinus caribaea* and *P. taeda*.]** *Rep. Qd. For. Serv. 1949–50*, 1950 (7).

Experiments in the use of 'Grodex' (triphenyl tetrazolium bromide) for rapid determination of viability of *P. caribaea* and *P. taeda* seed gave no useful results with *P. taeda* but more promising ones for *P. caribaea*. Seed of the latter needed soaking for 72 hours to give deep colouring of the embryo. These tests were made on seed one year after collection, and it was found that with seed of this age the simple cutting test gave a figure for sound seed approximating very closely to the laboratory germination.

2895. FINNIS, J. M. **Seed maturity in Douglas Fir.** *Res. Note B.C. For. Serv.* No. 18, 1950. pp. 4 + 4 gphs. 4 refs.

On the basis of a limited experiment, it is concluded that the specific gravity of cones of Douglas Fir gives no indication of seed maturity. Cone weight, weight of samples of 100 seeds, and the selenium method of testing, were also unsatisfactory. The most promising criterion of maturity appears to be length-growth of excised embryos. [Cf. *For. Abstr.* 12 (No. 2884).]

23.23.3. *Methods of Sowing*

See also *For. Abstr.* 12 (Nos. 2932, 2953–5).

2896. Beltram, V. Ručna sijačica. **[Hand sowing-stick.]** *Šum. List* 74 (3/4), 1950 (151–3). [Croat.]

An adaptation (illustrated) of Heyer's circular rake for use as a sowing-stick. The main part of the appliance is a long piece of aluminium tubing, funnel-shaped at the top, and with apertures at the bottom end.

2897. Lothigius, W. Några resultat av streckrutsådd i Jönköpings län. **[Some results of direct sowing in drills on screefed patches in Jönköping.]** *Svenska Skogsv-Fören. Tidskr.* 47 (1), 1949 (1–16). [Sw.]

A more detailed account of experiments with Pine [cf. *For. Abstr.* 11 (No. 245)] and Birch.

2898. Golubinski, S. S. Mul'chirovanie pochv pri lesokul'turnykh rabotakh. **[Soil mulching in articial regeneration work.]** *Lesn. Khoz.* 1950 (2), (58–60). [Russ.]

Mentions [with little detail] a number of examples of the improvement in growth and survival obtained by mulching nursery and direct sowings of various species in different parts of the U.S.S.R from 1926 onwards. Gives in rather more detail the results of mulching trials in Scots Pine sowings in the dry Pine forests at Lebyazhinsk, Altai Krai, in 1941 and 1946–48. These showed that mulches of brushwood, Scots Pine twigs or forest litter, all decreased soil surface temperature and increased soil moisture and seedling survival, the two last mulches giving the best results. In a trial by V. E. Smirnov in 1948, patch sowings of Scots Pine were made under uniform shade from *Salix acutifolia* with and without a mulch of natural litter. First-year survival in the autumn was (*a*) for the patches under canopy but not mulched, 6 times and (*b*) for the patches both shaded and mulched, 23 times, that of unmulched sowings in the open.

2899. Akimochkin, N. G. Vyrashchivanie duba na krutosklonakh posevom zheludey. **[Raising Oak on steep slopes by direct sowing.]** *Agrobiologiya* 1950 (3), (124–9). [Russ.] A.P.B.

Deals with the afforestation in 1924–25 of the sunny, eroded sides of dry valleys round the Novosil' Experiment Station, Orlov, in the middle of the forest-steppe zone, on clayey to loamy variants of grey forest soils over loess. Owing to the steepness of the sides and the risk of further erosion, acorns of Pedunculate Oak were dibbled in, 6–8 cm. deep, without any cultivation of the sod or bare earth, 2–3 acorns together at spots spaced either 50 × 50 or 50 × 25 cm. The resulting stands were fire-protected and weeded, but remained otherwise untended. During the German occupation some fire and unregulated felling occurred but on the whole the stands remain healthy and have developed well. Sample-plot data, which are tabulated, show that growth was very slow for the first 10 years but then improved, especially from the 15th year onward. Owing to the density of the sowings, no herbaceous growth survived under the canopy and a good forest litter developed. In 1947 the trees bore mast, and advance growth was present under the canopy in 1948. At 24–25 years old the stands (9,000–12,000 trees per ha.) had mean heights of 7·3–8·5 m., volumes of 63–68 cu.m./ha., and current annual height increments for 1949 were 30–40 cm.

2900. Service forestier du Niger: rapport pour l'année 1949. **[Annual report of the forest service of French Niger Colony for 1949.]** *Bois For. Trop.* No. 15, 1950 (295). [F.]

Broadcast sowing of *Acacia senegal* followed by hoeing was very successful even in a very dry year (136 mm. of rain), whereas spot sowing was a failure.

2901. Service forestier du Togo: rapport pour l'année 1949. **[Annual report of the forest service of Togoland for 1949.]** *Bois For. Trop.* No. 15, 1950 (296–7). [F.]

Cassia siamea is sown direct on ridges 2 m. apart, at a rate of 3 kg. of seed per ha. Sowing must be done as soon as the first rains break, so that the seedlings may be sufficiently developed to withstand the dry season. In the very dry areas, all seedlings less than 25–30 cm. high die after the rainy season.

23.24. Formation of Stands by Planting

2902. **[A study of soil and site factors influencing regeneration in the Ponderosa Pine region of central Oregon.]** *Rep. Pacif. Nthwest. For. Range Exp. Sta. 1949*, 1950 (39).

A preliminary analysis from Pine plantations on arid pumice soils during 1948 and 1949 indicated that seedling mortality was not directly correlated with lack of soil moisture, but that grass and brush competition were more decisive factors. Both in 1948 and in 1949, the plantations in the zone of highest precipitation suffered the greatest losses of seedlings.

23.24.1. *Planting Material*

See also *For. Abstr.* 12 (Nos. 2691, 2879–80, 2910, 2951).

2903. Allen, R. M. **Clipping and dipping reduce Longleaf mortality.** *Sth. For. Notes Sth. For. Exp. Sta.* No. 71, 1951 (1).

Clipping the needles and dipping the tops in lanolin or wax reduced mortality of Longleaf Pine seedlings to 17% (⅓ of needle length removed) or 13% (⅔ of needle length removed) compared with 81% for controls. Dipping in wax without clipping gave 18% mortality.

23.24.2. *Methods of Planting*

See also *For. Abstr.* 12 (Nos. 2630–1).

2904. Holt, L. **The TreeP planting machine.** *Pulp Paper Mag. Can.* 51 (13), 1950 (124, 126).

Describes, with illustrations, and gives figures showing the performance of, the TreeP. [Cf. *For. Abstr.* 12 (No. 280).]

2905. Burger, F. W. Plantgaten maken met de grondboormachine. [**Making planting holes with a ground drill.**] *Ned. Boschb.-Tijdschr.* 21 (6), 1949 (166–8). [Du.]

A Ford Dearborn tractor with a ground-drill attachment was used. It was estimated that 1,200–1,500 planting holes could be made in an 8-hr. day. Costs per tree were estimated at *Fl.* 0·05–0·06, as against *Fl.* 0·12 by hand-planting.

2906. **Winter tree planting speeded with ditcher.** *Amer. Nurserym.* 93 (2), 1951 (10).

Describes the use of a 44-C, caterpillar-mounted ditcher, manufactured by the Barber-Greene Co., Aurora, Ill., for digging street-tree planting holes in frozen soil. The ditcher first dug a rectangular hole, 24 in. wide, 30 in. deep and 48 in. long, and then a similar one at right angles to the first, forming a cruciform hole. The corners were then broken with a few strokes of a pneumatic drill, leaving a round hole of the proper depth and diameter. The ditcher has a vertical boom which enables it to make completely vertical cuts and to dig in frozen ground or even rocky formations such as caliche, coral, or shale.

23.24.3. *Spacing. Geometric Arrangement*

See also *For. Abstr.* 12 (No. 3527).

2907. La densité des peupleraies. [**The spacing of Poplar plantations.**] *Action for. pisc.* No. 160, 1951 (1–2). [F.]

A discussion, by several correspondents, of the various biological and economic factors involved in the choice of spacing.

23.24.4. *Time of Planting*

2908. Šlander, J. Jesensko in pomladansko pogozdovanje s saditvijo. [**Autumn versus spring planting in afforestation.**] *Gozd. Vestn.* 8 (1), 1950 (5–16). 11 refs. [Sloven.croat.russ.]

Discusses this theme on the basis of literature and the author's own experience, with the conclusion that, with present afforestation technique, the old rule 'plant hardwoods in autumn, and conifers in spring' holds good for the majority of the forest areas of Slovenia. If, however, it were possible to find a suitable technique, it would be an advantage to be able to plant both hardwoods and conifers in autumn.

2909. Dement'ev, P. I. O srokakh posadki sibirskoy listvennitsy. [**Planting times for Siberian Larch.**] *Lesn. Khoz.* 1950 (2), (87–8). [Russ.]

Trials near Moscow in 1949 showed that it is possible to plant naked-rooted 2-year-old seedlings and 3-year-old transplants of Siberian Larch in any of the months April–July with survivals [mid-September] of 98–99%, and in August with 95% survival. Stock must, however, be planted on the day of lifting. Planting was done on screefed spots 0·5 m. square, dug 1 spit deep and with a hole sufficiently large for the roots, the plant being set against one wall of the hole, which was then filled with loose soil and firmed. The number of trees so planted in each month varied from *ca.* 670 to 1,700.

2910. Stoeckeler, J. H. **How long can conifers be held in spring by cold storage.** *Tech. Notes Lake St. For. Exp. Sta.* No. 343, 1950. pp. 1.

In an experiment at the Hugo Sauer Nursery, Rhinelander, Wisconsin, Jack Pine, Red Pine, White Pine and White Spruce trees were lifted on 3 May and stored at 50° F. for 1, 2, 3, 4, and 5 weeks respectively before transplanting. In a parallel experiment, trees were lifted at weekly intervals from 3 May to 7 June and transplanted immediately to determine the effect of late transplanting. First-year survivals were 95% or higher for the 3 Pine spp. whether stored 1 or 5 weeks. White Spruce dropped to 93% after 4 and to 81% after 5 weeks; survival of all trees lifted and planted immediately was 95% or higher. The loss in weight from 5 weeks' cold storage ranged from 20 to 42% and was highest for Jack Pine. Loss of weight was also high for trees transplated late without cold storage. Late transplanting in both cases appeared to affect growth adversely.

23.25. Formation of Stands by Vegetative Reproduction

2911. Singh, D. P. **Cultivation of Willows and Poplars in Lahaul.** *Indian For.* 76 (12), 1950 (526–7).

Willows are commonly planted along water channels and on moist ground near springs and streams in Lahaul, a dry tract lying above 9,000 ft., in the Himalayas. *Salix fragilis* is the species most often planted, but *S. viminalis* and *S. insignis* are also grown. Almost every village has its own grove of Willows which yields both firewood and timber. Poplars have recently been introduced for the same type of plantation, the species employed being *Populus nigra* var. *italica* introduced from Kashmir, the indigenous Himalayan Poplar (*P. ciliata*), and a doubtfully native Balsam Poplar. Planting is done in March and April after the melting of snow. Bunches of 4–5 setts are planted at a spacing of 15–20 ft. The reason for planting in bunches is that the planting areas are not closed to grazing, and cattle, sheep and goats strip the bark off the outer setts. Setts should be fast grown, bearing natural heads of branches, and free from disease or wounds, and should be *ca.* 12 ft. long when planted. They should be obtained from pollards or stools and not from side branches, which do not generally do so well. Setts are planted in holes 2–3 ft., deep and carefully firmed in. In 4–5 years from planting, the setts that are tied together in a bunch begin to form a single trunk, and in *ca.* 10 years attain a height of 15 ft., with dense foliage. The trees are lopped for firewood at intervals of 3 years, the bark and smaller twigs being used as fodder.

23.26. Plant Rearing. Nursery Practice

See also *For. Abstr.* 12 (Nos. 2668–74, 2691, 2824, 2898, 2903, 2910, 3409, 3434–6, 3443).

2912. Beltram, V. Racionalizacija pošumljavanja. Suhi rasadnici. **[Rationalization of afforestation. Nurseries in arid areas.]** *Šum. List* 74 (3/4), 1950 (118–25). [Croat.russ.]

In the most arid part of Macedonia, with an annual precipitation of only 400 mm., some 300,000 transplantable one-year seedlings of various coniferous and hardwood species were raised without irrigation in 1946 and 1947. Similar results were achieved on stony soil in the Split area. On the Montenegrin littoral, transplants have been used for 25 years for the afforestation of both arable and non-arable soil. During the last few years, successful sowings of *Pinus nigra* have aided afforestation in Macedonia, Serbia and Slovenia. *From author's summary.*

2913. **Nursery practice and operation.** *Rep. N.Y. St. Conserv. Dep. 1949*, 1950 (52–3).

During the 1949 season, more than half the planting stock distributed by the State nurseries was sorted and counted over special tables with moving belts. Maximum production per day was 500,000 trees, using 4 tables. An innovation was the use of a long conveyor belt, which carried the untied bundles to an electric tier. A supply of trees is lifted in advance, to avoid a break in the work in bad weather. Progress is being made in the adaptation of a potato digger for lifting trees from the seedbeds and removing the excess earth from their roots.

2914. Nixon, W. A. **Sowing of Beech and Oak seed.** *Quart. J. For.* 45 (1), 1951 (49).

The method used by the author is to sow the seed, as soon as collected, in 7-in. strips, 2 ft. 9 in. apart, heaping as much as 10 in. of soil on

the seed, and so making it almost impossible for mice to get at it. About 1 April, when the Beech seed begins to germinate, the heaped-up earth is carefully scraped off, leaving just a shallow covering. Oak should be uncovered about 10 days later. Great care must be taken not to injure seedlings when scraping off the earth. This method usually gives complete success, though in some years mice have attacked the seed.

2915. Bushey, D. J. **Regeneration of the root systems of Pin Oak (*Quercus palustris*) and American Elm (*Ulmus americana*) following transplanting in the fall and spring.** *Abstracts of Doctoral Dissertations, Ohio State University, Columbus* No. 52, 1946–47 (39–46). L.S.

Root regeneration in *Q. palustris* and *U. americana* was studied in order to determine whether the ability of a plant to produce new roots after transplanting is an important factor in its survival. Transplanting of *Q. palustris* was difficult, but more successful in spring, when more new rootlets were formed, than in autumn, when loss of fibrous roots and necrosis of the lateral-root ends occurred. Transplantings of *U. americana* succeeded at either season, and after one or two growing seasons no significant difference in average root regeneration of autumn- or spring-transplanted trees was obvious. At the end of one growing season average regeneration of rootlets on *U. americana* was greater than on *Q. palustris* in both spring and autumn transplants. At the end of 2 growing seasons autumn transplants of *U. americana* produced more new rootlets than autumn transplants of *Q. palustris*, but there was no great difference between the number of rootlets produced by spring transplants of *U. americana* and spring transplants of *Q. palustris*. *Q. palustris* regenerated more new rootlets from the sides of the laterals than from the ends, whereas in *U. americana* the converse was found.

2916. Essai d'application d'hormones. **[Trial application of hormones.]** *Rapp. Inst. nat. Étude agron. Congo Belge 1949*, 1950 (32). [F.]

At the time of replanting, the roots of seedlings of *Entandrophragma cylindricum* were treated with a solution of 'Transplantone' (a commercial product with a vegetable hormone base). Nine months after treatment, the plants displayed greater vigour and root development and 15–20% higher survival, than controls.

2917. Zheltikova, T. A. Opŷt vŷrashchivaniya seyantsev sosnŷ v pitomnikakh Uzbekistana. **[An experiment in raising Pine seedlings in Uzbekistan nurseries.]** *Lesn. Khoz.* 1950 (2), (78–81). [Russ.]

Trials were made near Tashkent in 1947–48 of *Pinus sylvestris*, *P. pallasiana* and *P. eldarica*, on 2 soils characteristic of Uzbekistan nurseries—(1) a light-coloured serozem with a watertable more than 5 m. below the surface, and (2) a heavy meadow-swamp clay-loam with brackish groundwater at a depth of 0·7 m. Mortality of *P. sylvestris* was too heavy for any conclusions to be drawn, but the other two species gave much better, though variable, results. Sowings were made (*a*) on both soils in single lines along small ridges 50 cm. apart and 'watered by infiltration', and (*b*) on site (1) alone, in furrows 60 cm. apart, watered by flooding. Amounts of seed used were 4 g. for *P. pallasiana* and 8 g. for *P. eldarica*, per running metre. Treatments included soaking seed for 24 hours before sowing, and soaking plus a sawdust mulch on the seedbeds. Results were much better for (1) than for (2). On site (1) seed soaking + mulching gave the best field germination % for both (*a*) and (*b*), but (*b*) was unsatisfactory owing to soil crusting and the damage caused to seedlings during cultivation to break up the crust. On site (2), seed soaking improved the germination % but mulching was detrimental. These trends were the same for both species of Pine. Survival in autumn of the same year was improved by mulching and still more so by shading with screens; combined mulching and screening was usually more effective than mulching but less so than screening alone. *P. pallasiana* showed good survival on site (1) and poor on site (2); that of *P. eldarica* was somewhat lower and not clearly correlated with soil type. Method (*b*) coninued to show inferior results. Both species made most growth in their first season on site (1); growth data are also included [but soil types are not specified] for the second year, during which summer mortality was slight. *P. eldarica*, however, must be watched for winter frost damage, as temperatures of – 28° C. caused die-back of both 1- and 2-year-old seedlings in spite of a covering of straw and

snow. Practical recommendations are made on the basis of the results, which are tabulated.

2918. LEIBUNDGUT, H. Bodensterilisation im Forstgartenbetrieb. **[Soil sterilization in forest nurseries.]** *Schweiz. Z. Forstw.* 101 (9), 1950 (437–53 + 2 plates). 9 refs. [G.f.]

Experiments were made at the Federal School of Technology to test the efficacy of soil sterilization in controlling damping off. Steam sterilization gave excellent results for Spruce, Pine and Larch seedlings, reducing mortality by 100%. The effect on Alder [*A. incana*] was the reverse, mortality being actually increased and growth reduced, probably because infection with *Bacterium radicicola* was inhibited. Sterilization of the soil with formalin was less effective for the conifers, but reduced mortality to zero for Alder. The total length of 1-year-old seedlings of Spruce and Pine was greater in steam-sterilized than in unsterilized soils, the difference increasing according to the type of soil in the order raw humus, forest soil, peat. The cost of steam sterilization is relatively low; one man can sterilize 25–40 sq. m. of seedbed in one day.

2919. BELTRAM, V. Kalcifikacija rasadnika. **[Liming of nurseries.]** *Šum. List* 74 (5), 1950 (187–200). 7 refs. [Croat.f.]

Stresses the need for liming acid soils, and discusses in some detail the use of (1) natural limestone, (2) wood ash, (3) $CaCN_2$, (4) sugar-mill carbonated lime sludge. Quotes an instance of a forest nursery on a very acid soil of the Karst red-soil type: its very poor yield was spectacularly improved by manuring it in spring with 2,000 kg. Olive-stone ash and 3,000 kg. lime-kiln dust per ha. The improvement due to this single treatment has lasted for years. Another instance refers to manuring a part of an acid-soil garden with muddy sediment containing road-dust. The tomato yield on the plot thus treated was 30 times greater than on the control. The paper contains a table showing the requirements for calcareous material of (1) slightly lime-deficient, and (2) heavy and (3) light, very lime-deficient soils. The figures vary from 0·3 to 10 kg./sq. m. Wood ash is recommended at a rate of 0·25 to 0·50 kg./sq. m. Ash from locomotive furnaces was also used at 1 kg./sq. m., after having been stored in the open for a year. The sugar-mill carbonated sludge seems to be an ideal manure for acid soils. It has been used in many parts of Jugoslavia, increasing yields on the average by 30–50%. The sludge contains *ca.* 40% finely comminuted $CaCO_3$, a considerable amount of P_2O_5 (*ca.* 0·65%), some K, and a lot of organic matter. The proportion to be used is 10 tons/ha. for slightly acid, and 20 tons/ha. for very acid soils. The effect lasts for as long as 10 years. The paper also contains a chapter on the use of charcoal dust, which appears to promote the activity of nitrifying bacteria and checks fungal growth.

2920. **[Manuring nursery beds.]** *Rep. Qd. For. Serv. 1949–50*, 1950 (8).

Response to animal manures in the Brisbane valley nurseries was marked, in contrast to earlier experiments. This is supposed to be due to the combined effect of the manure and the routine treatment with lead arsenate to control white grubs [cf. *For. Abstr.* 10 (No. 1030)]. Plots treated with manure alone are superior to controls, but the best results were obtained from plots treated with both manure and arsenate.

23.27. Arboriculture

See also *For. Abstr.* 12 (No. 2906).

2921. **Determining landscape planting costs.** *Amer. Nurserym.* 93 (2), 1951 (10–1).

Table (1) shows average time and amount of soil handled for each of the following operations, as well as for the total operation:— Digging, handling, planting, watering, pruning, guying and wrapping trees; for ball-sizes varying from 12 × 12 to 72 × 42 in. Table (2) shows average time for digging, handling, planting etc. for (*a*) bare-rooted shrubs, (*b*) shrubs with soil and burlapped, but not laced, and (*c*) for planting 1,000 sq. ft. with ground covers.

23.3. *Afforestation*

See also *For. Abstr.* 12 (Nos. 2899, 3563).

2922. POURTET, J. La mécanisation des travaux de reboisement. **[The mechanization of afforestation operations.]** *Rev. for. franç.* 1951 (1), (38–46 + 6 photos).

Account of a demonstration of bulldozers, ploughs, seed drills etc. in the Forest of Orleans, November 1950.

2923. ALLEN, J. C. **Pine planting tests in the Copper Basin.** *Journal of the Tennessee Academy of Science, Nashville* 25 (3), 1950 (199–216). 13 refs. L.S.

Plantings, which began in 1930 in the 23,000-acre desert caused by copper mining and smelting, showed the need for more information on species adaptability to such sites. Tests on 4 native Pines were accordingly begun in 1942. Height and survival records gave the following results: (1) *Pinus echinata*—poor survival and growth; not a useful species for this type of site; (2) *P. rigida*—good survival but slow growth; (3) *P. virginiana*—fair survival and growth; and (4) *P. taeda*—poor survival but good growth. Root development of *P. rigida* extended more than 6 ft. laterally and more than 2 ft. in depth. *P. taeda* had the smallest root development. Supplementary trials with 13 other *Pinus* spp. were carried out in 1944–46. *P. densiflora* was the only species to excel *P. rigida* in survival. *P. virginiana* made good growth when planted in a lightly mulched sowing of weeping lovegrass [*Eragrostis curvula*]. Annual mortality of all 4 Pines was high for 3 years after planting. None of them should be planted in areas subject to heavy SO_2 concentrations.

2924. NEWTON, R. W. B. **Afforestation of unrestored land.** *Quart. J. For.* 45 (1), 1951 (38–41 + 3 photos).

Describes afforestation of land in the Midlands worked for ironstone and left in hill-and-dale formation, particularly experimental plantings made at Boughton 40 years ago. The necessity of excluding rabbits and levelling rides at right angles to the hill-and-dale formation for purposes of extraction and to form firebreaks, is stressed. Soils are of roughly three types:—(1) heavy boulder clay on which only Alder grows fast, but which is considered possible for Oak; (2) areas covered with heavy limestone boulders, and (3) light soils, on both of which Sycamore and European Larch do best. Planting is confined to the ridges. Extraction has not yet taken place, but it is considered that the most successful method would be by wire rope fixed to a tractor working on the ride. Photographs are given of trees from the Boughton plantations (*ca.* 40 years old) including a Sycamore with clean bole of 20 ft., total height 60 ft., and quarter girth b.h. $8\frac{3}{4}$ in., and a Larch 65 ft. high with quarter girth b.h. of $9\frac{1}{2}$ in.

2925. OVINGTON, J. D. **The afforestation of the Culbin sands.** *J. Ecol.* 38 (2), 1950 (303–19). 16 refs.

A study of the effect of afforestation on the hydrographical conditions and nutrient status of the Culbin sands. [Cf. *For. Abstr.* 11 (No. 2492).]

2926. BUCHHOLZ, E. Einiges über die Scheljuga-Weide. Befestigung und Aufforstung von Flugsandflächen. [**Notes on Scheljuga Willow. Fixation and afforestation of shifting sands.**] *Forst u. Holz* 6 (5), 1951 (67). [G.]

Salix daphnoides, *S. acutifolia* and *S. caspica*, unlike most *Salix* spp., thrive on a sandy soil, and are widely used in south and central Russia for fixing moving sands. The trees thrive in open sites, the roots remaining fairly near the surface and spreading to a radius of up to 15 m. Directions for propagating from cuttings are given. They are useful species for preparing sand dunes for Pine, which may be planted among the Willows 2–3 years later. [Cf. *For. Abstr.* 12 (Nos. 301, 1068).]

2927. ANTONACCIO, P. A. Plantaciones de eucaliptos y sauces-álamos. Su costo hasta dos años de efectuadas. [**Plantations of *Eucalyptus* and *Salix alba*. Their cost up to 2 years after the completion of planting.**] *AIA, Revista de la Asociación de Ingenieros Agrónomos, Montevideo* 21 (88), 1950 (25–40). [Span.span.]

Presents the results of experiments carried out by the Mayo Forest Institute in the San José department on the Rio de la Plata, where plantations were made on shifting sand dunes. In the *Eucalyptus* plantations *E. saligna* was the principal species, but *E. rostrata*, *E. tereticornis*, *E. robusta*, *E. diversicolor*, *E. globulus* and *E. citriodora* were also planted, all at 2 × 3-m. spacing. Seedlings from early February sowings were put out in May, and throve in proportion to the amount of natural humus present. Based on 100 ha. the cost of raising seedlings, preparing the ground, transplanting, tending, and protection against ants was $124.77 per ha. for the whole period. *Salix alba* was planted in flooded parts of the same area, mainly in dune depressions, where there was a deep humus-clay horizon. Cuttings from existing plantations were planted at a spacing of 2 × 3-m. during June, August and early September. No soil preparation was possible owing to the flooded nature of the ground, but cuttings 1·5 m. long were used so that they were not submerged. Costs of

planting and tending (mainly clearance of weeds) for the whole period, based on 100 ha., amounted to $180.46/ha.

2928. Blokhuis, J. L. W. Heideaufforstung und Umwandlung von Kiefernpflanzungen in Drenthe NO-Niederlande). [**Afforestation of heathland and conversion of pure Pine [to mixtures,] in Drenthe (N.W. Netherlands).**] *Schweiz. Z. Forstw.* 102 (1), 1951 (34–52). 11 refs. [G.f.]

2929. Goor, C. P. van. De bebossingen in de Kempen. [**Afforestation in the Kempen.**] *Ned. Boschb.-Tijdschr.* 22 (5), 1950 (129–33). [Du.]

Describes methods of establishing and maintaining stands, mainly of Scots and Corsican Pine and American Oak, on poor soils in northern Belgium.

2930. Philippis, A. de. Reboisement et recherche forestière dans l'état d'Israël. [**Afforestation and forest research in the state of Israel.**] *Schweiz. Z. Forstw.* 102 (2/3), 1951 (97–107 + 5 photos). [F.g.]

2931. Rudolf, P. O. **Forest plantations in the Lake States.** *Tech. Bull. U.S. Dep. Agric.* No. 1010, 1950. pp. 171. 102 refs.

A manual of afforestation.

2932. Muniz, P. J. Costa. Notas sobre uma plantação experimental de Pinheiro do Paraná (*Araucaria brasiliana*, A. Rich.) nos solos dos Campos Gérais. [**Notes on an experimental plantation of Paraná Pine on the soils of Campos Gérais.**] *Arquivos de Biologia e Tecnologia, Curitiba* 3, 1948 (31–43 + 2 dgms. + 6 plates). 5 refs. [Port.port.e.] L.S.

This experimental plantation, made in 1946 in the region of Vila Velha, was planned to yield information about the possibilities of raising *Araucaria angustifolia* on the treeless plains of Campos Gérais. The seed was sown direct in the soil, which, in this region is sandy, acid and poor in nutritive substances and organic matter. The period from germination to 6 months proved the most critical, and damping-off is likely to occur then; the seedlings, however, are completely resistant to frost. Apart from ants, which caused numerous losses, no insect pests attacked the seedlings. Pines sown in cleared land grew better and were more vigorous than those protected by the natural vegetation of the uncleared plain.

23.4. *Formation of Forest by Natural Succession*

See also *For. Abstr.* 12 (No. 2765).

2933. Étude de la jachère forestière naturelle. [**A study of the natural forest fallow.**] *Rapp. Inst. nat. Étude agron. Congo Belge 1948*, 1949 (105–6). [F.]

Studies made at the research station at Yangambi, lead to the following conclusions:— Reproduction of manioc and of lianes discourages recolonization by forest species. The maximum width of clearings, if they are to be adequately recolonized, is 100 m. Recolonization is greatly aided if a certain number of trees and coppice regrowth are left standing in the clearing. It has been observed that *Harungana madagascariensis*, *Afrormosia elata*, *Cynometra mildbraedii*, and *Klainedoxa gabonensis*, do not reduce the yield of annual crops grown under them, but enhance the vigour of forest reproduction when the clearing reverts to fallow. On the other hand, *Pachylobus* and *Chrysophyllum*, which have denser crowns, have a definitely inhibiting effect on regeneration. A study of the influence of agricultural rotations on the rapidity of regeneration, showed clearly the inhibiting effect of manioc, the favourable influence of a weed-suppressing crop after a crop of manioc, and the advantage of closing the rotation with a plant of erect habit (e.g. maize or *Phaseolus*).

23.5. *Underplanting. Nurses. Filling Gaps (Beating up)*

See also *For. Abstr.* 12 (No. 2945).

2934. Kinka, W. Wprowadzanie buka i innych rodzajów cienioznośnych w drzewostanach sosnowych. [**Introduction of Beech and other shade-bearing genera into Pine stands.**] *Wydaw. pomocn. tech.-gosp. (Ser. B.) Inst. Bad. Leśn.* No. 14, 1948. pp. 46. 13 refs. [Pol.]

Presents material borrowed from Swiss, German and Russian literature as well as that derived from the author's own experience (underplanting and under-sowing of forests in the Polish province of Pomorze).

2935. BECKING, J. H. De verhoging van de rentabiliteit van de eikenteelt. **[Increasing the profitableness of Oak stands.]** *Ned. Boschb.-Tijdschr.* 22 (6; 7; 8), 1950 (161–7; 196–206; 225–34). 11 refs. [Du.du.e.]

Regeneration by sowing in rows under light cover is recommended as giving better results than either planting or natural regeneration. Yield tables for Oak in Germany and Denmark are compared with those for trial plots in Holland. It is concluded that the grade of thinning does not affect the total volume produced; the quantity of the final crop is influenced thereby, but exact data are lacking. Experiments in Germany and Switzerland on underplanting Oak with Beech have had poor results. Underplanting with conifers in Switzerland increased the total value of the stand without apparent deterioration of the soil. Experiments are to be made in Holland on underplanting with *Picea abies*, *Abies alba*, *Pseudotsuga taxifolia*, *Abies grandis*, *Picea sitchensis*, *Chamaecyparis lawsoniana*, *Tsuga heterophylla* and *Thuja plicata*.

24. TENDING OF STANDS AND TREES

See also *For. Abstr.* 12 (Nos. 2998, 3065).

24.1. *Cleanings*

2936. CALLIN, G. Tidsåtgången vid röjning i ungskogsbestånd av tall, uppkomna efter sådd. **[Time required for cleaning young Pine stands established by direct sowing.]** *Medd. SkogsforsknInst., Stockh.* 38 (3), 1949. pp. 26. [Sw.sw.e.]

As a result of time studies carried out between 1945 and 1947, formulae are presented for calculating the time spent in cleaning stands of *Pinus sylvestris* and the walking time involved. The mean deviation of calculated from observed time for the sum of the 2 operations was 13·6% which may be considered satisfactory since the areas studied were widely separated and 18 different workers were studied.

2937. WAHLENBERG, W. G. **A long-term test: a quarter century of forest regrowth in a cut-over and cleaned Appalachian cove.** *Sth. Lumberm.* 181 (2273), 1950 (183–7).

In an area which had been clear felled and in which natural regeneration had taken place, plots cleaned at 8 years and receiving no further treatment have, at 34 years, 6 cords more volume per acre than adjacent uncleaned plots. The cleaned area contains 213 more trees of desirable species—*Liriodendron tulipifera*, *Robinia pseudoacacia*, *Quercus borealis* and *Q. muhlenbergii*, *Tilia glabra*, *Magnolia acuminata* and *Fraxinus* sp., and the % of undesirables (chiefly *Halesia* sp.) is only half that of the uncleaned area.

24.2. *Thinnings*

See also *For. Abstr.* 12 (Nos. 2842, 2848, 2935, 2998, 3012, 3065, 3109, 3189, 3509, 3527).

2938. ROE, E. I., and STOECKELER, J. H. **Thinning over-dense Jack Pine seedling stands in the Lake States.** *J. For.* 48 (12), 1950 (861–5).

Thinning plots of ½ acre each were established in 1942 in a very dense stand of *Pinus banksiana* seedlings which originated in 1937. In 1947 (i.e. at 10 years old) the unthinned stand, in spite of heavy mortality from natural suppression and hare damage, contained 7,500 trees/acre. Further thinning plots were made at beginning of 1947. In November of the same year a very heavy fall of wet snow severely damaged the unthinned stand; over 50% of the trees were broken off or bent beyond recovery, and another 10–20% of the stand was uprooted, leaving gaps up to ¼ acre. Damage to the plots thinned at 10 years was even more severe, but the plots thinned at 5 years were very little damaged. Thinning at 5 years to 4 × 4 ft. spacing took 4·2–6 man-days/acre, and possible ways of reducing this figure by some kind of mechanical strip thinning are discussed.

2939. FIXMER, F. N. **Progress report mechanical thinning experiment in Jack-pine on the Mosinee Industrial Forest.** *Pulp Paper Mag. Can.* 51 (13), 1950 (120, 122). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1107 (*F*–2).)

Mechanical thinning was done in dense 10-year-old regeneration by an Athens disk, cutting a 6-ft. swath behind a Caterpillar D-4 tractor. The following methods were used: (1) Disking in an east-west direction

leaving 6-ft. strips standing and removing 50% of the stand—cost of disking $2.70 per acre. (2) Disking as in (1), and also in a north-south direction, removing 75% of the stand—$6.00 per acre. (3) Disking in an east-west direction, leaving 3-ft. strips standing and removing 66% of the stand—$4.40. Hand thinning with an axe cost $10/acre. Results of measurement after 5 growing seasons are tabulated. Method (1) had little effect on d.b.h. or height growth of thrifty trees; (2) and (3) gave a considerable increase in d.b.h. of thrifty trees, and (3) the best height results. Rabbit damage was high in the control plot and that thinned by method (1).

2940. BULL, H. **Pointers on thinning Southern Pine.** *Sth. Lumberm.* 181 (2273), 1950 (259–60).

Advice on age, frequency and intensity of thinnings.

2941. HUMMEL, F. C. **Interim note on a thinning study in young Pine in East Anglia.** *Forestry* 23 (2), 1950 (78–89). 3 refs.

Thirteen Scots Pine and 14 Corsican Pine plots were established in East Anglia between 1938 and 1943 in 18- to 25-year-old plantations, in order to determine the effect of different thinning treatments on increment, thinning yields, and general development of the stand. Periodic annual increment has averaged 150–200 cu. ft., quarter girth, over-bark, per acre, p.a. in Corsican Pine; and 100–120 cu. ft. in Scots Pine. The under-bark figures are about 17% less. Thinnings between the ranges of B and D grades do not seem to affect volume increment appreciably, but thinning heavier than a D grade cause a definite loss in increment. Very heavy thinnings (D++) have caused a loss in increment per acre but have not produced a check in the rate of growth of the surviving trees. There is some evidence thas heavy thinnings increase liability to attacks from *Fomes annosus*. The present moderate thinning policy in East Anglia appears to produce average thinning yields of about 30 to 40 cu. ft. quarter girth, over-bark, per acre, p.a., for Scots Pine, and about 50 cu. ft. for Corsican Pine, starting at an age of about 12 years. *From author's summary.*

2942. MATSON, E. E., and RAPRAEGER, H. A. **Fall Creek second-growth Douglas-Fir thinning study.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 70, 1950. pp. 13.

Cf. *For. Abstr.* 12 (No. 3178).

2943. **[Experimental thinning of *Cleistanthus collinus*.]** *Rep. For. Dep. C.P. & Berar 1947–8*, 1950 (9–11).

Summarizes data from 2 sample plots laid out respectively in 1909–10 and 1923, to test different degrees of thinning. Owing to defects in the layout and operation of the experiments, it is impossible to make any certain deductions, but there are indications that the most paying method of management might be to leave crops unthinned or only lightly thinned until *ca.* 33% of the stems have reached at least 4 in. diameter, and then do a crown thinning, exploiting these larger stems, and let the remainder of the crop grow on until the maximum number of stems reach the best exploitable size, 5–6 in. diameter.

24.3. *Opening of the Canopy. Release and Improvement Fellings (including Poisoning and Girdling)*

See also *For. Abstr.* 12 (Nos. 3082–3, 3361–7).

2944. CAMPBELL, R. S., and PEEVY, F. A. **Poisoning certain undesirable southern hardwoods for forest and range improvement.** *Amer. Midl. Nat.* 44 (2), 1950 (495–505). 13 refs.

Cf. *For. Abstr.* 11 (No. 1048).

2945. MUNTZ, H. H. **Releasing Pine planted under scrub Oak.** *Sth. Lumberm.* 181 (2273), 1950 (200–1).

In February 1948, Slash [*Pinus caribaea*], Loblolly [*P. taeda*] and Longleaf [*P. palustris*] Pines were planted in a stand of scrub hardwoods consisting mainly of Blackjack [*Quercus marilandica*] and Post [*Q. stellata*] Oaks. Some seedlings were released immediately after planting, some 1 year, and some 2 years later. Methods of release included girdling and the application of Ammate crystals in notches. Two degrees of release were tested:—complete, in which all hardwoods over 0·5 in. d.b.h., and partial, in which only those over 3·0 in. d.b.h., were treated. After 3 growing seasons, survival and growth for seedlings released immediately after planting were much better than

for those released later. Methods and intensity of release have comparatively little effect on the results.

24.4. *Shelterbelts. Windbreaks*

2946. LINDE, R. J. VAN DER. Het houtwallenprobleem in Nederland. **[The shelterbelt problem in the Netherlands.]** *T.N.O.-Nieuws, 's-Gravenhage* 4 (43), 1949 (368–75). 23 refs. [Du.]

Discusses the advantages and disadvantages to the Dutch farmer of shelterbelts and hedges.

2947. LINDE, R. J. VAN DER. Houtopstanden en bodemverstuiving. **[Tree planting and wind erosion.]** *Maandblad voor de Landbouwvoorlichtingsdienst, 's-Gravenhage* 5 (11), 1948 (530–6). [Du.]

Results of experience of shelter plantings, particularly in Denmark, are discussed. In Holland, the bulb fields have in the past been divided by low (1–1½ m.) Beech and taller (3–4 m.) Alder hedges, but the new bulb fields are being laid out without hedges. In Kennemerland, on light sandy soil, a network of narrow Alder hedges, 3–4 m. high, prevents wind erosion.

2948. HILLE RIS LAMBERS, D. Enige bezwaren van windschermen. **[Some disadvantages of windbreaks.]** *Maandblad voor de Landbouwvoorlichtingsdienst, 's-Gravenhage* 5 (11), 1948 (536–8). [Du.]

Discusses the spread of *Aphis* spp., *Calcocoris norvegicus* and other harmful insects, and of rusts, from common hedge plants and trees into agricultural crops.

2949. ROSENE, W. JR. **Spreading tendencies of Multiflora Rose in the Southeast.** *J. Wildlife Mgmt.* 14 (3), 1950 (315–9). [U.S. Fish and Wildlife Service, Gadsden, Alabama.] B.A.P.

Rosa multiflora, widely recommended for hedges and wildlife cover in the Midwest and Northeast, shows definite tendencies to spread in Alabama and Georgia, and needs to be kept well under control in this region.

2950. KRAJSKI, W. Leśne pasy ochronne jako czynnik gospodarski zasobami przyrody. **[Forest shelterbelts as a factor in the management of natural resources.]** *Sylwan* 94 (1), 1950 (33–57). 26 refs. [Pol.russ.e.]

A survey of the drought-controlling influence of shelterbelts, based on Soviet literature, and quoting few numerical data. The establishment of Polish experimental shelterbelt stations is recommended.

2951. SHAPOVALOV, A. A. Dopolnitel'nye istochniki polucheniya lesoposadochnogo materiala. **[Supplementary sources of planting stock.]** *Lesn. Khoz.* 1950 (2), (85–6). [Russ.]

In view of the shortage of seed and planting stock for the projected shelterbelts in the steppe, the author urges that as much wilding stock as possible should be used. He describes briefly a trial in 1928 in which wildings of *Acer platanoides, A. tataricum, Caragana arborescens* and *Fraxinus pennsylvanica* were dug up or handpulled in spring from shelterbelts and plantations, transported in baskets with earth over their roots, and grown on in the transplant beds at the Kamennaya Steppe experiment station. Handpulling was possible only for plants not more than 3 years old on sites with loose topsoil. Best survival was given by plants up to 3 years old from the margin of plantations and shelterbelts, or from gaps inside them. Plants above this age showed satisfactory survival when the stem was cut back to 2 cm. on replanting in the nursery. Under such conditions, wildings of all the species mentioned can be successfully grown on if lifted just after the snow melts and re-planted as soon as possible.

2952. ZHUKOV, A. B., GODNEV, E. D., and SHUMAKOV, V. S. Voprosy agrotekhniki v dele sozdaniya dubrav. **[Agricultural technique [for preparing planting sites] for the formation of Oak stands [in the steppe region].]** *Lesn. Khoz.* 1950 (2), (16–24). [Russ.]

Reviews in general terms the history of Oak plantations in Stalingrad, Rostov and Astrakhan Provinces, with a map to show the 6 natural regions recognized. Distinguishes good, medium and poor sites for Oak according to their soils and topography, and recommends suitable measures of soil cultivation (aiming chiefly at moisture conservation by weed elimination and the retention of snow water), giving diagrammatic summaries of measures appropriate to the good and medium planting sites. Concludes with a reference to Lysenko's 'nest' method of direct sowing, and some suggestions on suitable agricultural crops and woody associates for Oak raised by this method.

2953. Ivanov, N. M. O poseve lesnykh polos gnezdovym sposobom. [**Direct sowing of shelterbelts by the 'nest' method.**] *Agrobiologiya* 1950 (3), (130–7). [Russ.] A.P.B.

Reviews data on first-year survival of shelterbelts sown by Lysenko's 'nest' method in autumn 1948 and spring 1949 in various districts of Kuybyshev. Results were very satisfactory on the whole, and much superior to those of row plantings, except where the standard practice had not been followed, e.g. where only 2–4 acorns per seed spot had been sown there were only 2,000–4,000 seedlings per ha. at the end of the first year instead of the 10,000–25,000 in belts sown according to plan. In other cases unsatisfactory results were due to late sowing or neglecting to use 'pre-germinated' acorns. About 86% of the area under afforestation by the nest method was sown with field crops as cover: in these sowings both height growth and survival were better than where there was no shelter from field crops. The article concludes with 2 tables showing necessary quantities of seed of the auxiliary tree and shrub species used.

2954. Semikhnenko, P. G. Posev lesnykh polos gnezdovym sposobom v Krasnodarskom krae. [**Direct sowing of shelterbelts by the 'nest' method in the Krasnodar region.**] *Agrobiologiya* 1950 (3), (156–60). [Russ.] [Vsesoyuznyy n.-i. Institut Maslichnykh Kultur, Krasnodar.] A.P.B.

Describes briefly a trial started in spring 1949 with the chief aim of discovering the effects of (1) inter-cropping with field crops as compared with (2) clean cultivation between the tree rows. The acorns used were from the northern Caucasus, where Pedunculate Oak predominates. The shelterbelts were 4 rows (18–20 m.) wide. In (1) the field crops sown were barley and winter wheat between rows and maize in the rows (between the Oak 'nests'). In (2), shrubs (*Caragana arborescens* and *Rhus cotinus*) and *Fraxinus pennsylvanica* were sown in the rows (between the 'nests') but the spaces between rows were kept clean-weeded and cultivated. After harvesting the cereals and ploughing in the stubble, measurements of the Oak were made on 28 July 1949. These showed that the numbers of Oaks per nest and their mean heights were respectively (1) 26·4 plants, 16·0 cm., and (2) 14·4 plants, 14 cm. A small-scale trial was also made (a single belt of each treatment) to compare the effects of deep (12–14) and shallow (6–8 cm.) cultivation of the site before sowing. Deep cultivation appeared to be advantageous, giving increases in number of plants per nest and in height growth.

Some account is also given of shelterbelt sowings made on various collective farms in the Krasnodar region. The seed used came from local steppe forests, where Pedunculate Oak predominates, and from the foothills on the Black Sea coast, where the chief species are Sessile Oak, *Q. armeniaca* and *Q. pubescens*. Growth of the last 3 species was slow, but that of the first, good. Finally, it is urged that where serious dust storms are likely, the young shelterbelts should be screened on the windward side by a strip of tall field crops (maize, sunflower etc.) 5–6 rows wide and 10–12 m. distant from them, in order to prevent their becoming buried in drifting soil.

2955. Pogrebnyak, P. S. O smykanii kron v nasazhdeniyakh duba, zalozhennykh gnezdovym sposobom. [**Crown closure in Oak stands raised by the 'nest' method.**] *Agrobiologiya* 1950 (3), (118–23). 1 ref. [Russ.] A.P.B.

Critics of Lysenko's 'nest' method of sowing Oak in shelterbelts have claimed that the spacing of the nests (5 × 5 m.) is too wide to give proper crown closure of the Oak within a reasonable time, calculating that closure will not occur until the stands are at least 20–25 years old. The present author, by extrapolation from figures relating to some 1-m. plots of densely sown Oak in the arboretum of the Kiev Forestry Institute, estimates that crown closure will occur about 11 years, and not more than 15 years, from sowing. Up to this date the functions of weed suppression and soil protection will be performed by the inter-sown shrubs and Norway Maple. Closer spacings of the 'nests' would probably endanger soil moisture supplies and give rise to a stand of poor trees, and thinning such stands could do little good, since the trees would be ill adapted to withstand the resulting exposure.

24.5. *Pruning*

See also *For. Abstr.* 12 (No. 2805).

2956. Wendorff, B. **An improved tree trimming appliance.** *Brit. Patent* No. 645,261, 25 Oct., 1950. pp. 3 + 4 dgms.

A circular saw is carried at one end of a handle and is housed in a casing, a flexible drive being contained in the handle.

2957. MARTS, R. O. **Wood quality of bud-pruned Longleaf Pine.** *Sth. Lumberm.* 181 (2273), 1950 (197–9). 3 refs.

A preliminary examination was made of Longleaf Pine about 20 years old, from a small plantation in southern Louisiana, to ascertain the effect of tree spacing and of annual removal of lower lateral buds and shoots, up to 15–20 ft., on the form of the trunk, the width of the annual rings and the density of the wood. Clear wood without knots was formed in the trunk from the pith outwards for the entire pruned length; the few defects could have been avoided by greater care in pruning. The wood of 5 trees at 6 × 12-ft. spacing (A) averaged 5·5 rings per in. at b.h. and 0·54 sp. gr., and that of 5 trees at 4 × 6-ft. spacing (B) 6·6 rings per in. and 0·52 sp.gr. These specific gravity values are above the average for second-growth Longleaf Pine of similar ring width. Taper was less below lower crown limits for trees of (B) than of (A). Trees in this study had less taper than those pruned to a height of 30 ft. [cf. *For. Abstr.* 12 (No. 327)]. Trees of (A) had a somewhat higher specific gravity and a greater average diameter in the lower part of the trunk than trees of (B), but total height growth was greater in the latter. These early results indicate that green pruning up to a height of 20 ft. did not harm later growth.

2958. **Green pruning of softwoods.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (10).

Examination of wood of 'green-pruned' Spruce stems (stems from which living branches had been pruned) from Forestry Commission land at Tintern (Monmouthshire), Bodmin (Cornwall), Gwydyr (N. Wales) and Thornthwaite (Cumberland), was completed. In all but the first area, both Norway and Sitka Spruce were examined. In no instance had disease followed pruning in the knots examined, but some stems from Gwydyr, Bodmin and Thornthwaite showed slight but definite signs of canker in the form of eruptions in or below the bark, black resinous bleeding and symptoms resembling the canker in pruned Norway Spruce from Perthshire. The usual period for complete healing—i.e. until the annual rings ceased to bend in towards the knot and began to run straight over and past the pruned snags—was 5 years. Results from Sweden show that Scots Pine can be green-pruned safely, but Norway Spruce only in the South where resin flow and healing are quick enough to prevent disease. This agrees with the few but definite cases of canker found after green-pruning in Great Britain.

2959. SHAW, E. W., and STAEBLER, G. R. **Financial aspects of pruning.** Pacif. Nthwest. For. Range Exp. Sta. 1950. pp. 45. 15 refs.

Pruning tables are given for Ponderosa Pine and Douglas Fir in the Pacific Northwest with examples of their use, to show the cost per thousand bd. ft. of clear wood produced, the period during which it is produced most cheaply, and the relative effect of changes in different variables, e.g. diameter, costs and growth.

2960. LORENZ, R. W., and FOX, H. W. **Returns from pruning a young Red Pine plantation for Christmas greens.** *For. Note Ill. agric. Exp. Sta.* No. 18, 1950. pp. 3. 1 ref.

Pruning was carried out on a 0·13-acre plot of an 8-year-old Red Pine plantation in December, 1949. Trees were pruned to an average height of 31% of the total height. The pruned branches were taken by lorry to headquarters, weighed into 15-lb. bundles and sold. After meeting the cost of pruning and preparing the branches for sale, a net profit of $24.50 (equivalent to $188.46/acre) was made. If the branches had been sold wholesale in the forest, a net profit of $19.60, or $150.76 per acre, would have been made.

27. TREATMENT OF EXCESSIVELY OPEN STANDS

See also *For. Abstr.* 12 (Nos. 2744, 2868–9).

2961. WAHLENBERG, W. G. **From brush to Pine. How to convert Rhododendron brush areas to stands of White Pine timber [in the south-east U.S.A.].** *Sth. Lumberm.* 180 (2261), 1950 (40–1).

Thickets up to 3 ft. high may be cleared by hand in patches. Where the brush is taller, parallel lanes, of a width equal to ¾ the height of the brush, should be cleared, bulldozing being cheaper for brush over 14 ft. high. In the latter type of clearing, *Pinus strobus* seedlings should be planted at roughly 6-ft. spacing. By its 13th year, and with little or no tending, the Pine will usually dominate the brush. [Cf. *For. Abstr.* 12 (No. 328).]

3. FOREST UTILIZATION. FOREST TECHNOLOGY

31. PROPERTIES AND ANATOMY OF WOOD. WOOD RESEARCH

2962. Ugrenović, A. Tehnologija drveta. **[Wood technology.]** Nakladni Zavod Hrvatske, Zagreb. 2nd ed. (rev.), 1950. pp. viii + 502 + 24 sets of photos. 102 refs. Price *Din.* 234. [Serb.] I.F.B.

A much enlarged and revised edition of the original textbook of 1932. The data presented are largely from native and foreign researches on Jugoslav timber species. A special section of the book (pp. 322–464) describes the current methods of investigation at the Institute of Wood Technology in Zagreb University, and details the basic characteristics and properties of 17 conifers, 72 broadleaved and 20 exotic species. There are 24 plates and 284 drawings, graphs and photographs, of which 229 are originals, a glossary of 227 specific names in Serbo-Croat, Russian, English, French, Italian, and German, and a general index.

2963. Wechel, A. te. Fijnhout. **[Quality timber.]** N. V. Uitgevers Mij. Diligentia, Amsterdam. 2nd ed., 1949. pp. 128. 34 refs. [Du.] P.R.

Contains sections on wood compared with other materials, wood anatomy, the relationship between anatomy and technical properties, colour, the economic and commercial importance of wood, and the demand for and supply of quality timber; with lists of quality timbers arranged by country or continent of origin, and by families; and notes on the properties of some 150 timbers.

31.0. *General Information on Woods*

See also *For. Abstr.* 12 (Nos. 2650, 2686, 2779, 2781, 2799, 2824, 2981).

2964. **Possibilities of increasing the use of tropical timber.** Organisation for European Economic Co-operation, Paris. [1950]. pp. 95 + 4 photos, 2 maps.

A report of a group of experts. Contains, *inter alia*, sections on: timber sources, exploitation, conditioning, marketing, comparison between tropical timber and European and American timber, and sections dealing with economic aspects. The authors stress the need for more information and documentation, and recommend: extended mechanization and increased production of converted timber in the overseas territories; abolition of all monopolies, trade barriers and restrictive practices; abolition or reduction of export and import duties; and creation of an international tropical-timber technical association. Annex A contains a provisional list of some 300 tropical species classified by categories. Annex B deals with export and import duties on tropical timbers in certain countries.

2965. Hess, R. W., Wangaard, F. F., and Dickinson, F. E. **Properties and uses of tropical woods, II.** *Trop. Woods* 97, 1950 (1–132 + 12 plates). 92 refs.

[Cf. *For. Abstr.* 11 (No. 1074).] A further report on this investigation, presenting results of studies on a second group of 23 tropical timbers.

2966. Bond, C. W. **Colonial timbers.** Sir Isaac Pitman & Sons Ltd., 1950. pp. xv + 191. Price 30*s*.

Descriptions of 46 species, each with photomicrograph and coloured plates.

2967. Chalk, L. **The timbers used in the new building [of the Imperial Forestry Institute, Oxford.]** *J. Oxf. Univ. For. Soc.* (*Ser. 4*) No. 5, 1950 (3–11).

Includes a list of all the timbers used, their provenance, and the uses to which they have been put. [Cf. *For. Abstr.* 12 (No. 2567).]

2968. Sheard, G. F. **Empire hardwoods in glasshouse construction.** *J. Minist. Agric., Lond.* 57 (8), 1950 (387–91). O.R.E.

Presents notes on the properties of 9 African hardwoods, thought to be suitable substitutes for the softwoods generally used in this type of construction. The most promising timbers as regards weight, strength, natural durability, availability, and cost, are Agba (*Gossweilerodendron balsamiferum*), Niankom (*Tarrietia utilis*), and Red Meranti (*Shorea* sp.).

2969. **Specimen woods Nos. 181–2.** *Suppls.* to *Wood* 16 (1; 2), 1951 (19–20; 59–60).

Celtis (*C. soyauxii*); and Poon (*Calophyllum tomentosum*).

2970. LAMB, G. N. **Foreign woods: origin, use, properties and nomenclature.** *Wood Prod.* 55 (12), 1950 (24); 56 (1), 1951 (20, 22).

(*a*) Borneo Camphorwood (*Dryobalanops aromatica*), Granadillo (*Dalbergia* sp.), Jackwood (*Artocarpus integrifolius*), and Karri (*Eucalyptus diversicolor*). (*b*) Akle (*Albizzia acle*), Molare (*Vitex parviflora*), and Tindalo (*Pahudia rhomboidea*).

2971. SCHMIDT, E. Übersee-Hölzer Nr. 24–5. [**Foreign woods Nos. 24–5.**] *Suppls.* to *Weltholzw.* 2 (12), 1950; 3 (1), 1951. Each pp. 2. [G.] P.R.

Alerce (*Fitzroya cupressoides*); Kotibe or Danta (*Cistanthera papaverifera*).

2972. **[Colonial timbers.]** *Bois For. Trop.* Nos. 15–6, 1950 (251–60; 361–8). [F.]

Kosipo (*Entandrophragma candollei*) and Teak (*Tectona grandis*); Saint-Martin rouge (*Andira coriacea*) and Wacapou (*Vouacapoua americana*).

2973. MÉNIAUD, J. L'azobé et ses utilisations. [***Lophira procera* and its uses.**] *Bois For. Trop.* No. 15, 1950 (261–6). [F.e.span.]

Compares the physical properties and mechanical strength of the wood with those of Oak, Teak, and other hard and durable species.

2974. MICHELSON, A. Deux bois d'ébénisterie *Fagara* aff. *melanorhachis* Hoyle, *Mammea* sp. [**Two cabinet woods, *Fagara* aff. *melanorhachis* and *Mammea* sp.**] *Études for. Com. nat. Kivu* No. 1, 1950 (19–46 + 2 photos, 7 tbls.). 8 refs. [F.]

Brief account of distribution and silvicultural characters, and detailed account of wood properties of two Belgian Congo species.

2975. **Information Leaflet. Foreign woods. Limba (Afara, Fraké, Korina) *Terminalia superba* Engl. et Diels. Family: Combretaceae.** *Rep. U.S. For. Prod. Lab., Madison* No. R1778, 1950. pp. 7. P.R.

2976. SCOTT, M. H. **The utilization of South African grown *Eucalyptus saligna*.** *Bull. Dep. For. S. Afr.* No. 34, 1950. pp. 15. Price 3*d*.

Deals with felling and sawing of logs; seasoning; yields of merchantable timber; figure, grain and working; weight, strength; durability and preservative treatment; and uses.

2977. BERKEL, A. Untersuchungen über die technischen Eigenschaften und Verwendung des Libanonzedernholzes (*Cedrus libanotica*). [**Properties and uses of the wood of Lebanon Cedar.**] *Proc. World For. Congr.* No. 3, 1950 (365–71). [G.]

31.1 *Structure. Anatomy. Identification*

See also *For. Abstr.* 12 (Nos. 2999, 3066, 3247, 3501).

2978. COZZO, D. Un recipiente con perforaciones que facilita la manipulación de secciones histológicas libres. [**A perforated receptacle which facilitates the handling of free histological sections.**] *Repr.* from *Boletín de la Sociedad Argentina de Botánica, La Plata* 3 (2), 1950 (105–8). 2 refs. [Span.e.] X.

The receptacle, which is described and illustrated, can be used to transfer specimens from one reagent to another. Good results were obtained with wood sections.

2979. DESCH, H. E. **The preparation of microscopic slides.** *Wood* 15 (12), 1950 (459–61).

2980. GREGUSS, P. **Identification of the most important genii [*sic*] of Firs [conifers] based on xylotomy.** *Acta Botanica, Szeged* 3 (1/6), 1948. pp. 62 + 31 photos, 31 dgms. [E.] K.

A key, with anatomical descriptions, microphotographs and diagrams, to 31 species of conifers. This article forms part of a book on the identification of conifers shortly to be published. [Cf. *For. Abstr.* 12 (No. 1149).]

2981. NORMAND, D. Note sur les bois de *Guibourtia arnoldiana* et de *Copaifera religiosa* du Mayumbe. [**Note on the woods of *G. arnoldiana* and *C. religiosa* from Mayumbe.**] *Bull. Jard. bot. Brux.* 20 (1), 1950 (19–30). 4 refs. [F.] O.B.D.

Presents distinguishing characteristics of the 2 species with particular reference to wood anatomy. *G. arnoldiana* rarely attains any

great diameter and is found near savanna woodland and on dry plateaux. The fruit provides a useful means of identification. *C. religiosa* on the other hand is typical of the primeval formations of dense equatorial forest and grows large enough to provide 5 or 6 sawlogs averaging 1 m. in diameter. The volume of wood obtainable, however, is reduced by a relatively high % of sapwood, which is not durable and which produces an abundance of resinous exudations. The anatomy of *C. religiosa* is compared with that of other African *Copaifera* spp.

2982. Cozzo, D. Anatomía del leño secundario de las Leguminosas Papilionóideas Argentinas silvestres y cultivadas. [**Anatomy of the secondary xylem of the wild and cultivated Papilionatae (Leguminosae) of Argentina.**] *Revista del Instituto nacional de Investigación de las Ciencias naturales, Ciencias botánicas, Buenos Aires* 1 (7), 1950. pp. 361 +31 plates. Numerous refs. [Span.span.e.g.f.] P.R.

A study of the wood structure, presenting descriptions of the anatomical characteristics of the Argentine Papilionatae, with a key to the species and some taxonomic considerations of the Leguminosae as a whole, and of the genera of the Papilionatae in particular.

2983. Sakornbut, S. S. **Differentiation of woods of Southern Pines by chemical means.** *J. For.* 49 (2), 1951 (109–11). 4 refs.

As a result of a number of tests, it was concluded that variation in % of mineral constituents of wood could not be relied upon to identify the various southern Pines, since such variation is due much more to site than to species. Heartwoods of *Pinus palustris, P. caribaea, P. taeda* and *P. echinata* can be distinguished with a high degree of probability by absorption spectrophotometric determination in the ultra-violet region. For all species, heartwood can be differentiated from sapwood by the spectrophotometric method and also by colour reaction with $FeCl_3$.

2984. Kisser, J., and Lehnert, I. Ein neues Verfahren zur Bestimmung des Früh- und Spätholzanteiles bei Nadelhölzern. [**New method for differentiating springwood and summerwood in conifers.**] *Mitt. öst. Ges. Holzforsch.* 3 (1), 1951 (10–4). 6 refs. [G.g.] P.R.

Describes a new method, consisting in subjecting the end-grain wood surfaces of air-dry specimens to the action of H_2SO_4. Springwood is strongly attacked, transition wood less so, while summerwood is hardly attacked at all, because the ability of H_2SO_4 to penetrate by capillary forces into the deeper layers of the wood is reduced as the membranes get thicker and the lumen size decreases. The result of this treatment is to bring the annual rings into relief, portraying even the finer details with great clarity. A method is also described for making the best use of these tests and comparing different specimens of the same wood. *From authors' summary.*

2985. Müller-Stoll, W. R. Photometrische Holzstrukturuntersuchungen. II Mitteilung. Über die Beziehungen der Lichtdurchlässigkeit von Holzschnitten zu Rohwichte und Wichtekontrast. [**Photometric investigations of wood structure. Part II. The relationship between transparency of wood sections and density and the relative densities of late and early wood.**] *Forstwiss. Cbl.* 68 (1), 1949 (21–63). 23 refs. [G.g.] [Forstbotanisches Institut der Technischen Hochschule Dresden in Tharandt.]

[Cf. *For. Abstr.* 11 (No. 321).] Photometric experiments with a number of different species showed that, although there is a linear relationship between the extinction coefficient and the density of the wood, different species with the same density have very different values for the penetration of light. The absorption of light into wood is influenced, not only by density but by numerous anatomical characters, such as colour of the fibre walls, content and number of parenchyma and ray cells, and resin content. Within single groups of wood of the same anatomical type, however, there is a relationship close enough to enable density to be determined by photometric methods. Staining more or less increases the light absorption properties of the wood and therefore cannot be used in photometry; it is useful, however, when making optical estimations of the proportion of late to early wood. The amount of light reflected from cross-sections varies considerably with species, depending on anatomical structure. It is only related to density in so far as it never exceeds a certain maximum, which always corresponds to a definite fraction of the cell-wall/air-space ratio. In studies of the relationship

between the density of early and late wood, values varying from 1 to 3·1 have been found. A purely gravimetric determination of this relationship is difficult and only possible with certain species. A 'semi-optical' method can be used when one element (either the early or the late wood) can be separated and treated mechanically, and the proportions measured by optical methods. Some values reached by one or other of these methods for various hardwoods and softwoods are presented. The difficulties of estimating the relationship between the relative densities of early and late wood in the same species by photometric methods are complicated by the fact that a magnifying lens must be used, and loss of light is incurred by scattering of the rays. When a magnifying lens is used the extinction coefficients no longer show a linear relationship to the density, but follow an irregular curve. Since no direct measurement of the loss of light can be made, it is necessary to construct from values estimated by gravimetric or 'semi-optical' methods, a curve for each type of wood, by which the values obtained with the magnifying lens can be corrected.

2986. WARDROP, A. B., and PRESTON, R. D. **The fine structure of the wall of the conifer tracheid. V. The organization of the secondary wall in relation to the growth rate of the cambium.** *Biochimica et Biophysica Acta, New York & Amsterdam* 6 (1), 1950 (36–47). 20 refs. [E.e.f.g.] O.R.S.

[Cf. *For. Abstr.* 11 (No. 2740).] The tracheid length and angle of micellar orientation in tracheids from successive annual rings in 3 specimens of *Pseudotsuga taxifolia* were measured. For the data obtained, the mathematical relation between spiral angle and tracheid length [cf. *For. Abstr.* 11 (No. 319)] was applied and further relations between tracheid length and age were derived. It appears, for these specimens, that in tracheids which have elongated more rapidly, the micellar spiral tends to be flatter than in those which have elongated more slowly. It seems, therefore, from the rather scanty material, that while the micellar spiral orientation is governed by cell length, it is also influenced secondarily by the rate of extension of the cambial initial from which the tracheids are formed.

2987. HODGE, A. J., and WARDROP, A. B. **An electron microscopic investigation of the cell wall organization of conifer tracheids and conifer cambium.** *Aust. J. sci. Res.* 3*B* (3), 1950 (265–9 + 10 photos). 25 refs. P.R.

An electron micrograph of a replica of the inner surface of the secondary cell wall of a conifer tracheid, demonstrating the almost transverse orientation of the microfibrils in this layer, is presented. This evidence provides confirmation of the type of cell-wall organization of conifer tracheids proposed in other investigations, on the basis of X-ray and optical evidence of microscopic examination. The existence of fibrils of 50–100 Å in diameter has been demonstrated in cell-wall fragments obtained by the disintegration of cambium initials and of conifer tracheids. It is suggested that these microfibrils may correspond to the 'micelles' or 'crystalline regions' inferred from X-ray examination. [Cf. *For. Abstr.* 11 (No. 2741).] *Authors' summary.*

2988. PRESTON, R. D. **A commentary on structural variation in conifer wood.** *Science* 112 (2907), 1950 (312). O.R.S.

Variations in the fine structure of conifer woods are so great, even within the same annual ring, that it is impossible to accept without further detailed investigation the theory that fungus damage causes a 'change in orientation' of cellulose fibres in the walls of tracheids of Chir Pine. [See *For. Abstr.* 12 (No. 1161).]

2989. BISSET, I. J. W., and DADSWELL, H. E. **The variation in cell length within one growth ring of certain angiosperms and gymnosperms.** *Aust. For.* 14 (1), 1950 (17–29). 17 refs.

[Cf. *For. Abstr.* 12 (No. 1157).] The variation in cell length within one growth ring at one level has been studied in 28 angiosperms and 8 gymnosperms. In those angiosperms with distinct growth rings, a definite increase in fibre length has been found from the first-formed early wood to the last-formed late wood within the one growth ring; in species without definite growth rings, little or no variation in fibre length has been observed over radial distances covering the growth of several years. The relationship between these changes in cell length and growing conditions has been discussed. In gymnosperms a slight but definite increase in tracheid length from early wood to late wood was noted in most cases. Where

compression wood was present, a definite drop in tracheid length occurred. *Authors' summary.*

2990. ANDERSON, E. A. **Tracheid length variation in conifers as related to distance from pith.** *J. For.* 49 (1), 1951 (38–42). 13 refs.

A relationship between tracheid length and distance from pith was found in 4 coniferous trees [1 *Abies concolor*, 1 *A. procera*, and 2 *Pseudotsuga taxifolia*]. The relationship could be expressed mathematically for each tree without regard to age or level in the trunk, provided that the portion of the bole close to the ground was eliminated. The shortest tracheids were found near the pith; outward from the pith, tracheid length at first increased rapidly, then more slowly and with a tendency to level off. Tracheids near the tree's base were shorter than those at higher levels at the same distance from the pith. Springwood tracheids in *Abies concolor* were found to be shorter than summerwood tracheids of the same annual ring. *From author's summary.*

2991. VASILJENIĆ, S. O širini traka lignuma nekih vrsta roda *Acer*. [**The width of the xylem rays in some species of Acer.**] *Glasn. šum. Fak., Beograd* No. 1, 1950 (116–51). 19 refs. [Serb.e.]

Samples were examined from one stem each of *A. heldreichii*, *A. obtusatum*, *A. monspessulanum*, *A. pseudoplatanus*, *A. campestre*, *A. platanoides* and *A. tataricum*, with the following results:—(1) Rays of a given width appear at a given age, and the number of rays of a given width will depend on the age of the growth ring examined. (2) Narrow rays appear earlier than broader ones and in regular order; 5-seriate rays never precede 4-seriate ones, etc. (3) Wide rays are less numerous than narrower ones, but increase in number in later years, decrease a little, and then remain constant. (4) Narrow rays are more numerous in most species. Their number decreases between the 1st and 20th year and then remains more or less constant. (5) The difference between the number of rays of the same width in successive growth rings is smaller for wide than for narrow rays. (6) The variation in the number of rays of a given width increases with the variation in width of the growth rings themselves. (7) The variation in the number of rays in successive growth rings is the less the narrower the growth rings.

Rays of *A. tataricum* were found to be 1- to 3-seriate; those of *A. platanoides* 1- to 5-seriate, of *A. heldreichii*, *A. obtusatum* and *A. campestre* 1- to 6-seriate, and of *A. monspessulanum* and *A. pseudoplatanus* 1- to 7-seriate. Earlier investigations had found that rays of *A. campestre* were 2- to 4-seriate, those of *A. pseudoplatanus* up to 8-seriate or more and those of *A. platanoides* up to 6-seriate.

No attempt is made to establish the possibility of identifying individual species of *Acer* from ray width. This will probably depend on the solution to a problem left unanswered in this investigation, i.e. the effect of ring width in individual species on (1) the time of appearance of rays of maximum width, (2) the number of rays of given width per unit of area, and (3) the variation in number of rays of a given width in consecutive growth rings.

2992. MINERVINI, I. L'accrescimento autunnale del 1949 in *Viburnum tinus* L. [**Autumnal growth of *V. tinus* in 1949.**] *Nuovo G. bot. ital* (*n.s.*) 56 (4), 1949 (706–7). [It.] A.P.B.

Cf. *For. Abstr.* 11 (No. 1853).

2993. VERGNANO, O. L'evoluzione della cerchia legnosa in *Arbutus andrachnoides* Link. in Firenze, dal luglio 1946 al giugno 1947. [**The development of the annual ring in *Arbutus andrachnoides* at Florence, from July 1946 to June 1949.**] *Nuovo G. bot. ital.* (*n.s.*) 56 (4), 1949 (639–45 + 9 photos). 4 refs. [It.it.e.] A.P.B.

2994. MAUGINI, E. L'evoluzione della cerchia legnosa in *Quercus pubescens* W. e in *Quercus ilex* L. nel clima di Firenze (dal giugno 1946 al giugno 1947). [**The development of the annual ring in *Q. pubescens* and *Q. ilex* in the climate of Florence (June 1946–June 1947).**] *Nuovo G. bot. ital.* (*n.s.*) 56 (4), 1949 (593–611). 2 refs. A.P.B.

2995. GIANNUOLI, S. Ulteriori osservazioni sull'attività cambiale del fico durante il 1949. [**Further studies of the cambial activity of *Ficus carica* during 1949.**] *Nuovo G. bot. ital* (*n.s.*) 56 (4), 1949 (707–9). [It.] A.P.B.

Cf. *For. Abstr.* 11 (No. 200).

2996. PAOLIS, D. DE. Ulteriori dati sul ritmo di accrescimento del *Rhamnus alaternus*

L. nel 1949. **[Further data on the growth rhythm of *R. alaternus* in 1949.]** *Nuovo G. bot. ital.* (*n.s.*) 56 (4), 1949 (705–6). [It.] A.P.B.
Cf. *For. Abstr.* 12 (No. 1154).

31.2. *Physical Properties*

See also *For. Abstr.* 12 (Nos. 3503–4).

2997. REECE, P. O. **Utilisation. Some notes on the systematic selection of particular species for particular uses.** *Quart. Rev. Timb. Developm. Ass.* 2 (11), 1950 (10–1 + 2 dgms.).

An attempt at tabulating the results of performance testing carried out in laboratories, for the purpose of presenting the available information in a way directly useful to the practical man. Six well known timbers are arranged in their order of merit under the headings of lightness, stability, durability, bending strength, impact strength and hardness. Two charts show the order of merit of 86 Empire hardwoods and 26 Empire softwoods, graded for their (radial and tangential) shrinkage.

2998. CHEVEDAEV, A. K. Znachenie tekhnicheskikh svoystv drevesiny dlya lesnogo khozyaystva. **[The significance for forest management of the technological properties of wood.]** *Lesn. Khoz.* 1950 (2), (48–53). [Russ.]

Urges the need for studies correlating timber quality—as shown by physical and mechanical tests—with forest types or site types and rate of growth etc. Such studies can be particularly important when judging the value of exotic species or the products of tree breeding and selection. Provisional data on the physical and mechanical properties of wood from a few sample trees of (1) native [Pedunculate?] Oak and Scots Pine, (2) Red and Pedunculate Oaks and Siberian Larch, and (3) *Fraxinus pennsylvanica* and *excelsior*, all grown in the Ukraine, are tabulated to illustrate this theme. Such data are available for only a limited number of species and forest site types, but more intensive research should obviously be undertaken. The figures quoted in the present paper suggest that: (1) in some site types Scots Pine should practically replace Oak, since, on balance, its timber quality and growth make it a better proposition; (2) Red Oak and Siberian Larch are both promising exotics for planting in moist Oak/Maple/Lime forest, but the Larch must be kept dense in youth to retard its excessively high growth rate, which results in low-quality timber in the centre of the stem; and (3) *Fraxinus pennsylvanica* is inferior to *F. excelsior*, except possibly for sites subject to prolonged flooding, where the latter species does not thrive.

2999. KIRST, G. Über die sogenannte Steinbuche und ihre Holzeigenschaften. [*Fagus sylvatica* **var.** *quercoides* **Persoon [not Kirchn.] and the properties of its wood.**] *Forstwiss. Cbl.* 69 (11), 1950 (669–80). 7 refs. [G.]

The anatomy and physical and mechanical properties of wood are described and compared with those of normal Beech [*Fagus sylvatica*] from the same stand. From the age of *ca.* 30 to 76 years the annual rings of *F. sylvatica* var. *quercoides* begin to become irregular and form a wavy grain. The density of the wood increases from the heartwood outwards, the converse of that of normal Beech. All static and dynamic strength properties of the wavy-grained wood were markedly inferior to those of normal Beechwood. On the other hand, the normal inner wood of var. *quercoides* had strength properties far higher than those of the normal Beech tested, and far higher than the average for normal Beech.

31.21. Conductivity

3000. HEARMON, R. F. S., and BURCHAM, J. N. **The dielectric properties of wood. I. Preliminary experiments on air-dry wood.** *Progr. Rep. For. Prod. Res., Lond.* 1950. pp. 13. P.R.

The dielectric constant and loss tangent of 12 air-dry timbers have been measured by a resonance method. There is a close connexion between the dielectric constant and density, but no such relation exists for loss tangent. *From authors' summary.*

31.22. Relation to Water, Air, Gases

3001. **Timber-weighing apparatus.** *Rep. Dep. sci. industr. Res. N.Z.* 1950 (33).

A direct mechanical method of determining moisture content of wood samples throughout timber stacked in a vapour-drying kiln is being

developed. Samples are weighed at intervals by means of a pneumatic capsule.

3002. Mesure du degré d'humidité des bois. **[Measurement of the moisture content of wood.]** *Étude tech. Inst. nat. Bois* No. 4, 1950. pp. 5 + 1. [F.]

Describes the gravimetric and electric methods of determination, and lists 6 French manufacturers of instruments for the latter (resistance or dielectric constant).

3003. **Seasonal variation in the moisture content of woods kept in different environments.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (14–5).

Samples of 1-in. and ½-in. Oak and Scots Pine were placed for a period of 2 years in the living-rooms, drawing-rooms, bedrooms, kitchens and halls of 4 houses heated by open fires or domestic hot-water boilers and in a centrally-heated office. Results are shown in graphs. An appreciable increase of moisture content occurred in living-rooms and bedrooms during the winter months. In the office, however, maximum moisture content values were obtained during the summer and autumn when the central heating was off. The average moisture contents of the samples in the living-rooms and bedrooms were 14 and 15% respectively, average values for Oak being ½% higher than those for Scots Pine. These sets of readings are somewhat higher than those obtained before the war, probably as a result of the present restricted use of fuel.

3004. Mathewson, J. S. **Behavior of radiant heated hardwood floors.** *Heating and Ventilating, New York* 47 (9), 1950 (63–6). D.S.I.R.

31.23. Weight. Specific Gravity

See also *For. Abstr.* 12 (Nos. 2957, 2985, 3262, 3481).

3005. Govers, A. Bepaling van de variatie van het soortelijke gewicht van houtsoorten met toepassing op de familie der Dipterocarpaceae. **[Determination of the variation in specific gravity within a species applied to the Dipterocarpaceae.]** *Rapp. Bosbouwproefsta., Bogor* No. 38, 1950. pp. 20. [Du.jav.du.e.]

Describes methods of determining specific gravity and tabulates average, maximum and minimum figures for 310 species.

31.27. Mechanical Strength

See also *For. Abstr.* 12 (Nos. 2677–8, 3068, 3147–9, 3242, 3262, 3481).

3006. Schofield, W. F. **Wood as a structural material.** *Wood Pres. News* 29 (1), 1951 (9–13). P.R.

Points out some characteristics of wood, particularly their effect relative to application of the formulae for basic strength of material.

3007. Norris, C. B. **Strength of orthotropic materials subjected to combined stresses.** *Rep. U.S. For. Prod. Lab., Madison* No. 1816, 1950. pp. 19 + 6 dgms., 10 gphs. 23 refs. P.R.

A theory of the strength of orthotropic materials subjected to combined stresses, based on the Henky/von Mises theory of energy due to change of shape, is presented. When this theory is applied to macroscopically isotropic materials, it yields the diagram currently used in design with metals. Equations relating the strength of orthotropic materials subjected to a single stress at angles to the natural axes of the material are deduced from the theory. These equations are shown to agree with available test values. *Author's summary.*

3008. Perem, E. **Effect of increased rate of loading on the bending and compression strength of wood.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1090, 1950. pp. 14 + 3 dgms., 3 gphs., 6 tbls. *Transl.* by E. Selman-Towt from *Medd. svenska Träforsknlnst. (Trätekn. Avd.)* No. 20, 1949. [*For. Abstr.* 12 (No. 374).] P.R.

3009. Liska, J. A. **Effect of rapid loading on the compressive and flexural strength of wood.** *Rep. U.S. For. Prod. Lab., Madison* No. R1767, 1950. pp. 10 + 7 photos, 20 gphs., 12 tbls. P.R.

Rapid loading tests in flexure and compression parallel to grain on Sitka Spruce, Douglas Fir, Maple and Birch specimens at *ca.* 12% moisture, show that the modulus of elasticity is small. Deflections and deformations to maximum load are about the same regardless of loading rate for softwoods, but they tend to increase as loading time is decreased for hardwoods. *From author's summary.*

3010. **Stress–strain relationships of steamed wood.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (16–7).

Tests were made to determine the influence of various factors on the compression stress/strain relationships of steamed wood. Prismoidal test pieces were used so that compression could be measured over the whole length. The deformation had a different form from that occurring when wood is bent, apparently because of the differing conditions of support. It is probable that results more nearly in accord with those during bending would be obtained by using a bobbin-shaped test piece in which compression would be measured over a central length of reduced cross-section. This will be tested when new equipment is available.

3011. Dohr, A. W. **Strength of Virginia Pine established.** *Sth. Lumberm.* 181 (2273), 1950 (225–6).

Results of strength tests at Madison on *Pinus virginiana* are given in graphs and are compared with those for other species of Pine. Its strength properties resemble those of *P. taeda* and *P. echinata*.

3012. Kraemer, J. H. **Growth-strength relations of Red Pine.** *J. For.* 48 (12), 1950 (842–9). 34 refs.

The material for this study was taken from 9 temporary sample plots covering the range of site classes of Connecticut plantations of *Pinus resinosa*. Trees were selected to cover the range of diameter classes within each plot; for each tree a series of specimens, 0·75 × 0·75 in., was prepared from both the north and the south radius of 4·5-ft. bolts cut at breast height. Average values for the physical properties of all 88 trees and all specimens, were compared with those of old-growth Pine, and were found to be materially lower, owing to the rapid rate of early growth of the plantation trees. The following conclusions were drawn from the results:—(1) Orientation of the specimen within the tree (north and south), had no significant effect upon modulus of rupture, fibre stress at proportional limit, or modulus of elasticity. (2) Amount of latewood on the cross-section had a significant effect upon toughness only, of all the mechanical properties measured. (3) Site, the individual tree, and position within the radius, significantly affected the mechanical properties of the static-bending test. (4) Specific gravity had no significant effect upon the difference of mechanical properties between trees on a given site, and less effect than rings per inch when the effects of several sites are involved. (5) Rings per inch had a strong effect upon all the mechanical properties measured except that of fibre stress at proportional limit. (6) Fibril angle had a strong effect upon both cross-breaking strength and stiffness.

It is recommended that *P. resinosa* should be spaced as closely as possible until crown closure and that thereafter the thinning programme should aim at maintaining growth at about 12 rings per inch. [Cf. *For. Abstr.* 12 (No. 1630).]

3013. Alexander, J. B. **The physical and mechanical properties of second-growth Douglas Fir.** *Bull. Amer. Soc. Test. Mat.* No. 169, 1950 (33–8). 8 refs. [Timber Mechanics Division, Vancouver Laboratory, Forest Products Laboratories of Canada, Vancouver, B.C.] P.R.

Data are presented for 7 logs of the 60- and 7 logs of the 90-year age class; partial data for the species, virgin growth; partial data for 1 shipment each of poles of the 30- and of the 60-year age class; and for 1 virgin-growth Douglas Fir tree tested over its full length (152 ft.). Analysis of the test results shows that in the area sampled, diameter growth is almost in direct proportion to age up to the 90-year age class; that growth rate is too rapid for high density and that density increases with increase in the radial distance from the pith. For the area sampled, the average density is slightly less than average values for virgin-growth Douglas Fir, although for the same rates of growth, i.e. number of annual rings per in., densities of second growth and virgin growth are almost identical. According to standard grading rules for structural timbers, second-growth Douglas Fir possesses adequate strength for heavy structural requirements. *From author's summary.* [Cf. *For. Abstr.* 12 (Nos. 1208, 2942, 3178).]

3014. Fritz, E. **Mechanical properties of second-growth Redwood and comparison with virgin timber.** *Bull. Amer. Soc. Test. Mat.* No. 169, 1950 (30–2). 4 refs. [School of Forestry, University of California, Berkeley, Calif.] P.R.

Data are presented for 10 trees, 65-year age class, of both sprout and seedling origin. Compared with wood from old-growth trees, the second-growth wood was found to be generally weaker except in one respect—shear parallel to grain.

3015. KINGSTON, R. S. T. **The mechanical properties of Red Tulip Oak (*Argyrodendron peralatum* (Bail.) C. T. White).** *Repr.* from *Australian Journal of Applied Science* 1 (1), 1950 (21–53). 18 refs. (*Repr. For. Prod. Aust.* No. 112.)

Tests on clear specimens from 6 trees from North Queensland showed this timber to rank high among timbers of similar density for almost all properties except work values in static bending. The main factor in variation of properties from bark to pith is the incidence of brittle heart, which causes a decrease in strength towards the pith. *From author's summary.*

3016. SCHOLTEN, J. A. **Nail-holding properties of Southern hardwoods.** *Sth. Lumberm.* 181 (2273), 1950 (208–10).

Tests, half in direct withdrawal and half in lateral resistance, were made on specimens of 18 species of Southern hardwoods. Results are tabulated. It was found possible to divide the species into 3 groups. Beech, Hickory, Red and White Oak and Pecan have the highest nail-holding properties, and species such as Basswood, Cottonwood, Willow and Yellow Poplar the lowest; other species fall into an intermediate group. Comparison of these results with those obtained in other investigations, including softwoods, demonstrates that nail-holding depends primarily on specific gravity. Nail-holding properties of the lighter hardwoods are close to those of the light softwoods, such as the Spruces and soft Pines, and those of the medium hardwoods to those of the heavier softwoods such as Douglas Fir and Western Larch; those of the heavier hardwoods such as Oak and Beech are much higher than those of the heaviest softwoods.

31.3. *Chemical Properties*

See also *For. Abstr.* 12 (Nos. 2686, 2983).

3017. LANGE, P. W. **Optical methods for micro analysis of the plant cell wall.** *Svensk PappTidn.* 53 (23), 1950 (749–66). 17 refs. [E.g.sw.] P.R.

Describes microspectrographical and microradiographical methods, and their use in wood analysis.

3018. SUNDMAN, J., SAARNIO, J., and GUSTAFSSON, C. **Paperchromatographic investigation of the carbohydrate composition of some wood species.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1239, 1950. pp. 5 + 6 photos, 2 tbls. 14 refs. *Transl.* by E. Selman-Towt from *Medd. Industr. CentLab., Helsinki* No. 74, 1950. [*For. Abstr.* 12 (No. 388).] P.R.

3019. GUSTAFSSON, C., SUNDMAN, J., and LINDH, T. **Quantitative method for determination of carbohydrates by means of paper partition chromatography.** *Pap. ja Puu* 33*B* (1), 1951 (1–3). 9 refs. [E.e.] P.R.

3020. TIMELL, T. **Studies on cellulose reactions.** *Acta Polytechnica, Stockholm* No. 63, 1950. pp. 275. 525 refs. [E.e.] P.R.

A critical comparison of methods for determining the amounts of amorphous and crystalline material in various celluloses. A critical survey is also given of some recent work in the field of cellulose reactions, and results of several etherification reactions of cellulose. *From author's summary.*

3021. PRESTON, R. D., HERMANS, P. H., and WEIDINGER, A. **The crystalline-non-crystalline ratio in celluloses of biological interest.** *J. exp. Bot.* 1 (3), 1950 (344–52). 16 refs. O.B.D.

Studies on cellulose from *Valonia ventricosa*, *Pinus radiata* and some Bambuseae.

3022. DOUGLAS, I. B. **The chemistry of cellulose and wood.** *Paper Tr. J.* 131 (22), 1950 (99–100, 103–6). 16 refs. P.R.

Discusses the structure of glucose and cellulose, the degree of polymerization in the cellulose chain, the degradation of cellulose, the crystalline nature of cellulose, oxy- and hemicellulose, and lignin.

3023. **The starch and related polysaccharides of certain hardwoods.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (32–3).

A method for isolating starch grains from sapwood sawdust with a minimum of chemical treatment is described. Typical yields (as a % of oven-dry original wood) of granular starch were: 1·2% from sapwood of Oak; 0·075% from Maple; and 0·16% from Elm.

3024. MITCHELL, R. L., and RITTER, G. J. **Galactan in Western Larch wood.** *J. For.* 49 (2), 1951 (112–4). 7 refs.

A quantitative determination was made by the U.S. Forest Products Laboratory of the galactan in Western Larch wood and sawmill refuse, for practical, commercial ends. Galactan in the lateral roots of virgin trees ranged from *ca.* 11 to 23%, based on the weight of oven-dry wood. The galactan control of slabwood from virgin-growth butt logs was found to be *ca.* 14%; from the middle logs 4·2–10%; and from the top logs, *ca.* 5%. Butt logs from fire-killed virgin trees contains *ca.* 9–16%; middle logs 6·6–12·1%; and top logs 6·6–7·8%. Butt logs of stand thinnings contained 3·8–5·3%; middle logs 2·2–3·5%; and top logs 2·2–3·1%.

3025. JENSEN, W., and NUOTIO, J. Om förekomsten av galaktan i björkved. [**The presence of galactan in Birch wood.**] *Pap. ja Puu* 33 (2), 1951 (33–5). 9 refs. [Sw.e.] [Institute of Wood Chemistry, Åbo Academy, Åbo, Finland.] P.R.

Samples of *B. verrucosa*, *B. pubescens*, and, for comparison, of *Picea abies* and *Pinus sylvestris*, were examined for their galactan content, by precipitation of the galactose in the form of mucic acid obtained by hydrolysis. Results are tabulated. Separate experiments, in which known amounts of galactose were dissolved in the hydrolysate of *B. verrucosa*, showed that small amounts of galactan may be missed in the method used. The mucic acid obtained may be derived from both galactose and galacturonic acid, so that its calculation as galactan only is an approximation. Since, however, parallel experiments with the same material gave reasonably consistent results, it is concluded that the results for different species may be compared with each other. The values for Pine (between 3·5 and 4·5% calculated as % of dry unextracted wood) were rather above, and those for Spruce (between 0·8 and 0·95%) were fairly close to those previously recorded. Values for *B. pubescens* ranged from 0·69 to 0·94%, and no galactan was found in *B. verrucosa*. No definite conclusions can be drawn from this small-scale investigation on a few random samples. It is intended to continue the study using a larger number of Birch samples selected on the basis of botanical and forestry research. [Cf. *For. Abstr.* 11 (No. 343).]

3026. KAJANNE, P. **On the composition of the fatty acids of Pine wood extract and tall oil. A spectrophotometric investigation.** *Acta chem. scand.* 4 (7), 1950 (1147–9). 6 refs. [Finnish Institute of Technology, Helsinki.] O.R.S.

3027. FOSTER, D. H., SCHWERIN, G., and COHEN, W. E. **The existence of a uronic acid ester in young wood of *Eucalyptus regnans*.** *Aust. J. sci. Res.* 3*A* (3), 1950 (504–11). 17 refs. P.R.

A comparison is made between the rates of hydrolysis of uronic acid anhydride and of pentosan, in wood and in delignified wood of young *E. regnans*. The results have been interpreted in terms of an ester in which uronic acid seems to be involved.

3028. UODA, H., FUKUSHIMA, B., and KONDÔ, T. **A study of substances in tree-trunks reacting positively with magnesium and hydrochloric acid. 1st report. Japanese Judas-Tree. 1. Concerning katuranin, a new flavanol.** *Transl. For. Prod. Aust.* 1950. pp. 19 + 2 dgms. 17 refs. *Transl.* by J. Oki from *Journal, Agricultural* [*Chemical*] *Society of Japan*, [*Tokyo*] 19 (7), 1943 (467–77). [*For. Abstr.* 11 (No. 1889).]

3029. SCHUERCH, C. **Experiments on the fractionation of isolated wood lignins.** *J. Amer. chem. Soc.* 72 (9), 1950 (3838–42). 20 refs. O.R.S.

3030. SCHUBERT, W. J., and NORD, F. F. **Investigations on lignin and lignification. II. The characterization of enzymatically liberated lignin.** *J. Amer. chem. Soc.* 72 (9), 1950 (3835–8). 8 refs. O.R.S.

Scots Pine, freed of native lignin by alcoholic extraction, was decayed by fungi and the lignin thus released was isolated by further alcoholic extraction. After 15 months of decay by *Poria vaillantii* 22·7%, and after 13 months decay by *Lenzites sepiaria* 18·3% of the residual lignin was thus isolated. The lignins released by the enzymatic activity of the 2 fungi were identical with each other and with the native lignin. This identity of the lignins suggests that there is a simple physical union rather than a chemical linkage between lignin and cellulose in wood. [Cf. *For. Abstr.* 11 (No. 1111).]

3031. RICHTZENHAIN, H. Über den oxydativen Abbau von Alkohollignin. [**The**

oxidation decomposition of alcohol lignin.] *Acta chem. scand.* 4 (1), 1950 (206). 4 refs. [G.] O.R.S.

3032. KRATZL, K. Über das 'Wasserlösliche Holz'. **['Water-soluble' wood.]** *Mitt. öst. Ges. Holzforsch.* 2 (6), 1950 (135–7). 26 refs. P.R.

Fir wood, when extracted with boiling water, gives an extract that, according to Schutz and Sarten, ought to contain the aliphatic preliminary stages of lignin. This extract has the same elementary composition as wood, and its 'sulphuric-acid-lignin content' corresponds to that of the wood. When degraded by oxidation, it gives, just as the wood, *ca.* 25% vanillin. Since Freudenberg found in it polysaccharide complexes, the author suggests for this extract the term 'water-soluble wood'. It certainly contains a pre-formed aromatic lignin-component. *From author's summary.*

3033. STUMPF, W., and FREUDENBERG, K. Lösliches Lignin aus Fichten- und Buchenholz. **[Soluble lignin from Spruce and Beech wood.]** *Angew. Chem.* 62 (22), 1950 (537). 1 ref. [G.] D.S.I.R.

A provisional communication describing a method of lignin extraction giving a very high yield of soluble lignin (85% of Beech lignin, somewhat less for Spruce lignin). The solvent used was dioxane with 1% water and 0·1 *N* HCl.

3034. RICHTZENHAIN, H. Zur Konstitution des Fichtenlignins. **[On the constitution of Spruce lignin,]** *Acta chem. scand.* 4 (4), 1950 (589–96). 23 refs. [G.g.] O.R.S.

3035. RICHTZENHAIN, H. Die phenolischen Gruppen des Fichtenholzes. **[Phenolic groups in Spruce wood.]** *Chem. Ber.* 83 (5), 1950 (488–91). 7 refs. [G.] P.R.

The permanganate degradation of Spruce wood methylated with diazomethane yields veratric acid and isohemipinic acid. The degradation products are compared with those obtained from the methylated HCl-lignin.

3036. LINDSTEDT, G. **Constituents of Pine heartwood. IX. The heartwood of *Pinus montana* Mill. X. The heartwood of *Pinus contorta* var. *latifolia* S. Wats. XI. The heartwood of *Pinus radiata* D. Don. XII. The heartwood of *Pinus ponderosa* Dougl. XIII. The heartwood of *Pinus jeffreyi* Balf.** *Acta chem. scand.* 3, 1949 (755–72). 9 refs. [E.e.] O.R.S.

The following constituents were isolated: from *P. montana*, pinocembrin (5,7-dihydroxyflavanone), pinosylvin (3,5-dihydroxystilbene), and pinosylvin monomethyl ether; from *P. contorta* var. *latifolia*, *l*-arabinose, pinobanksin (probably 3,5,7-trihydroxyflavanone), pinocembrin, pinosylvin monomethyl ether and a small quantity of *l*-arabinose; from *P. ponderosa*, pinosylvin and its monomethyl ether, *l*-arabinose and very small amounts of pinocembrin and pinobanksin; and from *P. jeffreyi* *l*-arabinose, pinocembrin and pinosylvin monomethyl ether. [Cf. *For. Abstr.* 11 (No. 2791).]

3037. LINDSTEDT, G. **Constituents of Pine heartwood. XIV. The heartwood of *Pinus monticola* Dougl. XV. The heartwood of *Pinus excelsa* Wall. XVI. The heartwood of *Pinus virginiana* Mill.** *Acta chem. scand.* 3, 1949 (1147–51; 1375–84). 11 refs. [E.e.] O.R.S.

The following substances were isolated: from *P. monticola*, pinitol, *l*-arabinose, chrysin (5,7-dihydroxyflavone), strobopinin (probably a C-methyl dihydroxyflavanone), tectochrysin (5-hydroxy-7-methoxyflavone) and pinosylvin monomethyl ether; from *P. excelsa*, pinitol, *l-arabinose*, chrysin, tectochrysin, pinobanksin, pinocembrin and pinosylvin monomethyl ether; and from *P. virginiana*, *l*-arabinose, pinobanksin, pinocembrin, and a very small quantity of pinosylvin monomethyl ether.

3038. LINDSTEDT, G. **Constituents of Pine heartwood. XVII. The heartwood of *Pinus aristata* Engelm.** *Acta chem. scand.* 4 (1), 1950 (55–9). 3 refs. [E.e.] O.R.S.

L-arabinose, chrysin, tectochrysin, pinocembrin and pinosylvin monomethyl ether were isolated. Pinitol could not be isolated, but small quantities of a methoxyl-containing substance in the sugar fraction were shown to be present. *Ftom author's summary.*

3039. ALVAREZ-NÓVOA, J. C., ERDTMAN, H., and LINDSTEDT, G. **Constituents of Pine heartwood. XVIII. A note on cryptostrobin, an isomer of strobopinin from the heartwood of *Pinus strobus* L.** *Acta chem. scand.* 4 (2), 1950 (390–1). 4 refs. [E.] O.R.S.

3040. ALVAREZ-NÓVOA, J. C., ERDTMAN, H., and LINDSTEDT, G. **Constituents of Pine**

heartwood XIX. The heartwood of *Pinus pinea* L., *Pinus pinaster* Aiton, *Pinus halepensis* Mill., and *Pinus nigra* Arnold var. *calabrica* (Loudon) Schneider. *Acta chem. scand.* 4 (3), 1950 (444–7). 2 refs. [E.e.] O.R.S.

From the heartwood of these Pines of Spanish origin, the following substances have been isolated: from *P. pinea*, *l*-arabinose, pinocembrin, and pinosylvin monomethyl ether; from *P. pinaster*, *l*-arabinose, pinobanksin and pinocembrin; from *P. halepensis*, pinosylvin and pinosylvin monomethyl ether; and from *P. nigra* var. *calabrica*, *l*-arabinose and pinosylvin monomethyl ether. *From authors' summary.*

3041. Lindstedt, G. **Constituents of Pine heartwood. XX. Separation of phenolic heartwood constituents by paper partition chromatography.** *Acta chem. scand.* 4 (3), 1950 (448–55). 13 refs. [E.e.] O.R.S.

All 9 phenolic substances so far isolated from Pine heartwood extracts can be separated and identified by paper partition chromatography.

3042. Lindstedt, G. **Constituents of Pine heartwood. XXI. The structure of pinobanksin.** *Acta chem. scand.* 4 (5), 1950 (772–81). 19 refs. [E.e.] O.R.S.

3043. Lindstedt, G. **Constituents of Pine heartwood. XXII. The isolation of pinostrobin and 3,5-dihydroxy-7-methoxyflavanone from the heartwood of *Pinus clausa* Vasey.** *Acta chem. scand.* 4 (7), 1950 1042–6). 6 refs. [E.e.] O.R.S.

Only one sample contained these substances.

3044. McDonough, E. S., Bell, L. S., and Arnold, G. **A water-labile fungistatic extractive characterising living trees.** *Nature, Lond.* 166 (4233), 1950 (1034). 3 refs.

Alcohol extractives of ground samples of heartwood, sapwood, and bark of *Catalpa speciosa* inhibited growth of the wood-destroying fungus *Schizophyllum commune* in proportion to the concentration of extractive used, heartwood extractive giving most inhibition, followed by sapwood and then bark. There is a negative correlation between fungistatic capacity of alcohol extractives and the length of time the branches are stored at room temperature in laboratory air or in water. Hot-water extractives had similar, but less lasting properties. It is suggested that these fungistatic substances (also obtained from *Ulmus americana*) account for the resistance of living trees to fungi that rapidly destroy dead wood of the same species. That there may be a connexion between these fungistatic materials and growth-regulating substances is suggested by the observation that dilute concentrations seem to have a stimulating effect on fungi.

3045. McDonough, E. S., and Bell, L. **Inhibition of growth of *Schizophyllum commune* by extractives from living trees.** *Abstr.* in *Phytopathology* 41 (1), 1951 (25).

Cf. preceding abstract.

3046. Ranganathan, S. K., Aziz, M. A., Koshi, T., and Sankaran, V. **Studies in contact toxicity. Part II. Reactivation of surface treated with dichloro diphenyl trichloroethane (DDT) by storage in a Burma Teak box.** *Proceedings, Indian Academy of Sciences, Bangalore* 30*B* (3), 1949 (176–84). 1 ref. O.R.S.

[Cf. *For. Abstr.* 11 (No. 3321).] The toxicity of glass surfaces treated with DDT, exhibiting only feeble activity against *Culex fatigans*, was found to be renewed after storage in a Burma Teak box. Storage in boxes of *Mangifera indica*, *Pinus longifolia*, *Dalbergia sissoo*, and Teak from the Central Provinces, had no effect on the toxicity. Light, darkness, humidity and temperature did not appear to affect the re-activation, which may perhaps be caused by the deposit of some substance from the wood on the test surface during storage. Further work is in progress.

3047. Sosa, A. Sur la composition chimique d'une Ericacée méditerranéenne: l'*Arbutus unedo* L. **[Chemical composition of a Mediterranean Ericaceous species, *Arbutus unedo*.]** *Bulletin de la Société de Chimie biologique, Paris* 32 (5/6), 1950 (344–56). 30 refs. [F.] L.S.

Describes some 15 organic compounds found for the first time in *A. unedo*; they are high alcohols (up to C 37), acids, sterols and phenolic substances.

31.4. *Durability. Decomposition*

See also *For. Abstr.* 12 (No. 2580).

3048. Steiner, D. Ergebnisse eines Versuches mit nichtimprägnierten und imprägnierten Eisenbahnschwellen aus Buchenholz verschiedener Fällzeit. **[The durability of**

treated and untreated sleepers of Beech-wood felled at different seasons.] *Schweiz. Z. Forstw.* 102 (1), 1951 (64–9). 3 refs. [G.f.]

The conditions of the experiment [cf. *For. Abstr.* 5 (p. 259)] and the prevalence of red heart made it impossible to draw any definite conclusions from this study, but there were strong indications that sleepers cut from trees felled in February and March were less durable than those from trees felled at other seasons. [Cf. *For. Abstr.* 10 (No. 2656); 12 (No. 3210).]

3049. FINDLAY, W. P. K., and SAVORY, J. G. **Breakdown of timber in water cooling towers.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. X.

Presents a review of literature on the breakdown of wood by fungi attacking the central layer of the secondary walls of wood elements in wet timber, and especially considers problems affecting timber in water cooling towers, where this type of cell-wall penetration is common. Fungi isolated from such affected wood are listed, and attempts to reproduce this type of breakdown in the laboratory are described. No evidence was produced to show that types of fungi listed are primary agents in such decay. Their presence seems to follow on the action of destroying basidiomycetes or partial hydrolysis by water, heat or chemicals.

31.42. Attack by Plant Organisms

See also *For. Abstr.* 12 (Nos. 2766, 2770, 3044–5, 3068, 3212, 3220, 3324).

3050. NOBLES, M. K. **Cultural identification of fungi causing decay in coniferous trees of British Columbia.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. X.

Presents the results of studies of decay in 8 species. Of the cultures isolated, about 85% belong to the Hymenomycetes, *Fomes pinicola*, *Polyporus schweinitzii* and *Stereum sanguinolentum* being most commonly represented. A type of decay in *Abies lasiocarpa* and *Tsuga heterophylla* (formerly attributed to *Echinodontium tinctorium*) yielded cultures, about half of which were *Stereum sanguinolentum*, not previously accounted of importance in these hosts. *Corticium galactinum* was also discovered to be the cause of a white rot which had been confused with that caused by *Poria subacida*. *Odontia bicolor* (previously frequently confused with *Polyporus abietinus*) proved an important cause of decay in *Picea glauca* and other hosts.

3051. KLOMPARENS, W. **Toxicity of cycloheximide to certain wood-rotting fungi, and preliminary studies on absorption of the antibiotic by tissues.** *Abstr.* in *Phytopathology* 41 (1), 1951 (22).

3052. **Sap-stain of wood.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (31).

The stain fungus most commonly found in samples of stained tropical hardwoods was *Diplodia* sp., possibly *D. natalensis*.

3053. MATHIESEN, A. Die Insektenbläuen Schwedens. [**Blue-staining fungi associated with insects in Sweden.**] *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. [G.] X.

Describes the fungi associated with different species of bark-beetle.

3054. FRANCKE-GROSMANN, H. Zur Ökologie und Taxonomie eines mit Borkenkäfern vergesellschafteten Bläuepilzes. [**The ecology and taxonomy of a blue-staining fungus** [*Ophiostoma* [*Ceratostomella*] *ips*] **associated with *Ips sexdentatus*.**] *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. [G.] X.

31.43. Attack by Animal Organisms

See also *For. Abstr.* 12 (Nos. 3086, 3206–7, 3215–6).

3055. MCBRIDE, C. F. **The effect of ambrosia beetle damage upon lumber value.** *B.C. Lumberm.* 34 (9), 1950 (46–8, 122, 124, 126, 128).

Cf. *For. Abstr.* 12 (No. 1206).

3056. Käferfrass im Bau (Teil 2). [**Damage by beetles in buildings. Part 2.**] *Holz-Helfer, Suppl.* to *Holz* 4 (11), 1950. pp. 2. [G.] P.R.

Description of *Anobium punctatum*, *A. pertinax*, *Xestobium rufovillosum*, *Ptilinus pectinicornis*, *Ernobius mollis*, *Lyctus linearis*, *L. brunneus*, and *Bostrychus capucinus*, and their control.

3057. Taylor, K. L. **Borer damage in packing cases and pallets.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 4 (10/12), 1950 (5–6). P.R.

Instructions are given for detecting *Lyctus* damage without unpacking the cases. Infested components of pallets should be removed and replaced with sound timber; fumigation alone is not sufficient.

3058. Hickin, N. E. **The New Zealand weevil *Euophryum confine* Broun: a new woodborer.** *Timber News* 59 (2139), 1951 (11).

Occurrence in U.K., description, nature of damage, and control.

3059. Sisley, C. **Another New Zealand weevil, *Pentarthrum huttoni*.** *Timber News* 59 (2141), 1951 (95).

Quotes several instances of *P. huttoni* as a timber pest in Great Britain.

3060. Wolcott, G. N. **An index to the termite-resistance of woods.** *Bulletin of the University of Puerto Rico Agricultural Experiment Station, Puerto Rico* No. 85, 1950. pp. 26. 3 refs. [E.Span.]

The data on which this index is based were obtained by exposing specimens of some 200 species to termite attack [cf. *For. Abstr.* 11 (No. 507)]. A number of temperate as well as tropical species are included. The index is arranged in one alphabet containing both vernacular and botanical names, and each species is given a numerical rating to represent its degree of termite resistance. Those few woods that are definitely repellent to termites are assigned a rating of 100 +; those that are very resistant are given numbers between 80 and 100, with 80 arbitrarily given to West Indian Mahogany heartwood; woods less resistant than Mahogany but more resistant than *Cordia alliodora* are given numbers between 60 and 79, those more susceptible than *C. alliodora* but less so than *Magnolia splendens* 40 to 59, while all the very susceptible woods have numbers between 20 and 39. Rating was in all cases based on heartwood; sapwood, in every species tested, is in varying degrees more susceptible to attack than the heartwood. For many coniferous woods, in which termite resistance is determined by resin content, only an approximate rating can be given.

3061. Sweetman, H. L. **Identification of pests by the damage they do.** *Pest Control* 18 (6), 1950 (23–38). D.S.I.R.

Illustrated key for the identification of pests based on damage characteristics, including refuse left by the pests (rodents, wood borers, termites, carpenter ants, and some other insects).

31.45. Injury by Fire

3062. **Prolonged heating of wood.** *Rep. Fire Res. Bd., Lond. 1949*, 1950 (15).

Study of the effect of pre-heating on ignition temperature of small samples of wood, was continued with sawdust pre-heated at 150° C. for 60 days. The ignition temperature fell from 313 to 259°; after further pre-heating the ignition temperature rose steadily; after 360 days the wood had lost 72% of its original weight. When heated at 130°, the ignition temperature fell from 291 to 272° in 65 days and subsequently increased. Similar results were obtained with small blocks of wood. No indication was obtained of any major change in the ease of ignition of wood by pre-heating, and it must be assumed that if so-called 'pyrophoric' carbon exists, it must be produced by factors which did not operate during the experiments described.

31.46. Injury by Atmospheric Agencies, Water etc.

3063. Frey-Wyssling, A. Die Verfärbung ungeschützten Holzes durch das Wetter. [**The discoloration of untreated wood by weathering.**] *Schweiz. Z. Forstw.* 101 (6), 1950 (278–82). 8 refs. [G.f.]

In a wet climate, untreated constructional timber turns grey, whereas in a dry climate with abundance of ultra-violet radiation it becomes dark or black. The surface of the grey wood is delignified and displays macerated tracheids, but in the blackened wood of Swiss chalets the lignin is transformed into dark humic substances. The first stage in the discoloration of wood is the transformation of lignin into soluble substances, which are then either leached out by rain, leaving the wood grey, or remain and become carbonized, producing blackened wood.

3064. Cheo, Y. C., and Cranch, R. C. **Weathering characteristics of certain**

tropical American woods. *Tech. Rep. Yale Sch. For.* No. 7, 1950. pp. 5.

Gives the results of weathering tests carried out with panels representing 27 tropical American hardwoods and 3 control species, White Oak, Central American Mahogany, and Teak.

31.8. *Quality and Defects of Timber*

See also *For. Abstr.* 12 (Nos. 2957, 2963, 2998, 3015).

3065. PAUL, B. H., and SMITH, D. M. **Summary on growth in relation to quality of Southern Yellow Pine.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1751, 1950. pp. 19 + 6 photos, 1 dgm., 7 gphs., 1 tbl. 28 refs. P.R.

Summarizes some research results obtained in studies with Loblolly, Longleaf, Shortleaf, and Slash Pines, and based on mechanical tests of old-growth and second-growth specimens. A considerable population of trees was analysed for specific-gravity variation, and for site and stand relationships. The results from the analyses include the influence of site, of soil moisture (including irrigation), of stocking, of thinning, and of released growth following logging, on the specific gravity and related properties of the wood. *From authors' introduction.*

3066. WARDROP, A. B., and DADSWELL, H. E. **The nature of reaction wood. II The cell wall organization of compression wood tracheids.** *Aust. J. sci. Res.* 3*B* (1), 1950 (1–13 + 12 photos). 25 refs. P.R.

[Cf. *For. Abstr.* 11 (No. 2814).] It was shown by optical and X-ray methods that the cell wall of compression-wood tracheids consists of two layers. In the outer layer the micelles are inclined at a large angle to the longitudinal axis of the tracheid, while in the inner layer this angle is relatively smaller. In the latter there exist radial discontinuities in the micellar structure, which account for the radial distribution of lignin observed in compression-wood tracheids. Such tracheids in *Pinus radiata* were shown to be appreciably shorter than would be the case if no compression wood were present. It is concluded that comparisons between compression wood and normal wood should be made on material of the same tracheid length and spiral organization. *From authors' summary.*

3067. ZYCHA, H. Über die Kernbildung und verwandte Vorgänge im Holz der Rotbuche. [**The formation of heartwood and allied processes in *Fagus sylvatica*.**] *Forstwiss. Cbl.* 67 (2), 1948 (80–109). 50 refs. [G.g.] [Forstbotanisches Institut der Universität Göttingen.]

[Cf. *For. Abstr.* 9 (Nos. 350, 947).] A study was made of red heart of Beech, i.e. the characteristic formation of tyloses and discoloration, in relation to moisture content, air content and fungus attack. It was ascertained that the moisture content of the trunk decreases from the periphery inwards. There is no sharp distinction in moisture content between sapwood and heartwood, but where the moisture falls to 60% of the dry weight of the wood, the red-heart zone begins. In the outer sapwood are many vessels containing 'air', but it is thought that this 'air' is probably CO_2, air containing O penetrating only occasionally into the heartwood. The author advances the theory that red heart is a physiological phenomenon occurring during some abnormal withdrawal of moisture reserves. Atmospheric O is drawn into the heartwood through dead branches. The filling of the vessels with such air and a continued withdrawal of water causes the formation of tyloses and the death of parenchyma cells with characteristic discoloration caused by oxidation. The influence of fungi is discounted. The phenomenon is not pathological but dependent on the age of the tree (the critical moisture content of 60% occurring at about 80 years) and upon site and climate.

3068. RENNERFELT, E., and THUNELL, B. Undersökningar över bokens rödkärna. [**Research on red heart of Beech.**] *Medd. SkogsforsknInst., Stockh.* 39 (4), 1950. pp. 36. 25 refs. [Sw.sw.g.] Price *Kr.*1.

Research was begun in 1947 on the extent and characteristics of red heart caused by frost, wide-spread in Beech stands in Skåne as a result of the severe winters of 1940–42. Results are shown in tables, graphs and diagrams. In material from trees of different ages, red heart was most extensive in trees over 100 years old with fairly wide annual rings; its extent was much less in trees with narrow annual rings and under 50 years old. Moisture content was highest (100–120%) in samples taken from the

outer sapwood, and lowest (50–60%) in the central zone of the red heartwood. In general, the red heartwood was found to be resistant to penetration by liquids in soaking and pressure-impregnation experiments, but the central zone of the red heartwood was sometimes found to take up water as readily as the outer sapwood. The sugar content of the red heartwood was found to be lower than that of the sapwood; the red heart was, however, more readily attacked by mould, suggesting that the sugar was more easily accessible than the larger amount in the sapwood. Laboratory experiments showed very little difference between red heartwood and sapwood in their resistance to *Coniophora puteana*, *Polyporus fomentarius*, *P. hirsutus* and *P. versicolor*. In some trees attacked by *P. fomentarius*, examination showed that both red heart and the fungus damage could be attributed to frost, but that there was no connexion between them. There is no evidence to show whether a fungus in a standing tree will spread more rapidly in red heart. Bending strength of red heartwood was much lower, and decreased with increasing discoloration. [Cf. *For. Abstr.* 8 (No. 309).]

32. HARVESTING OF WOOD. LOGGING

See also *For. Abstr.* 12 (Nos. 2645, 2867–8, 3108, 3112, 3512, 3536–7).

3069. SIMMONS, F. C. **Northeastern loggers' handbook.** *Handbook, U.S. Department of Agriculture, Washington, D.C.* No. 6, 1951. pp. 160.

3070. MAHEU, C.-F. Opérations forestières sur la côte pacifique. (*Suite.*) [**Logging on the Pacific Coast. (Continued.).**] *Bois For. Trop.* No. 15, 1950 (247–50). [F.e.span.]
Cf. *For. Abstr.* 12 (No. 1212).

3071. MAKKONEN, O. Hakkuttöiden aikatutkimustulosten soveltaminen käytäntöön. [**Practical application of the results of time studies in logging.**] *Julk., Metsäteho, Helsinki* No. 25, 1950. pp. 138. 40 refs. [Fi.e.]
Discusses with graphs and tables:—the influence of stem size on working time; wages per cubic unit, length unit, piece, and stem; and the influence of work difficulty factors (branchiness, bark thickness, density of stand, poor quality of trees, depth of snow, and air temperature) on wages.

3072. MAKKONEN, O. Juoksumetritaksan käyttö 'ylijäreissä' paperipuuleimikoissa. [**Application of the running metre rate in 'oversized' pulpwood stands marked for cutting.**] *Julk., Metsäteho, Helsinki* No. 26, 1950. pp. 28. [Fi.e.]
Suggested % increases in rates of pay are given for bolts of 7-in. diameter or over at the top of the bolt, and for those of 12-in. diameter or over, calculated on the mean of top and butt diameters of the bolt, for barked and unbarked, 2- and 4-metre Pine and Spruce pulpwood. *From author's summary.*

3073. KANTOLA, M. Tutkimuksia ammattitaidon ja työkalujen merkityksestä metsänhakkuutöissä. [**Investigation into the significance of professional skill and tools in logging.**] *Julkaisu, Työtehoseura, Helsinki* No. 52, 1949. pp. 98. 43 refs. [Fi.e.]
Presents tables and graphs from surveys made between 1940 and 1948 showing the types of tool in use, their efficiency, accident frequency, the number of forest workers in Finland by age groups, and the relationships between age groups and earnings. Legends to the illustrations, graphs and tables are in Finnish and English.

3074. LAMOTHE, G.-E. Mécanisation forestière. [**Mechanization in the forest.**] *Revue trimestrielle Canadienne, Montréal* 36 (142), 1950 (127–45). [F.] L.S.
Discusses problems of adapting mechanized methods to suit the particular labour conditions and the nature of the forests and terrain in eastern Canada.

3075. CZEREYSKI, K. Pokaz sprzętu motorowego do ścinki i wywózki drewna. [**Exhibition of power-driven appliances for tree felling and timber transport.**] *Sylwan* 94 (2), 1950 (69–75). [Pol.]
Report of a demonstration of power-driven appliances currently used in Polish forestry. Deals with electric and petrol-driven chain-saws (foreign), and skidders, trailers and lorries (foreign and Polish).

3076. LOVE, W. B. **The safe use of power saws.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 117 (*B*-7-*c*), 1950. pp. 6.
Recommendations on selection of operators, transport, maintenance and operation of the saw, felling and cross-cutting, and the provision and use of safety equipment.

32.2. *Felling and Related Operations*

See also *For. Abstr.* 12 (Nos. 2624, 3048).

3077. SGERM, F. Podiranje drevja s sekiro in žago. **[Tree felling by axe and saw.]** *Gozd. Vestn.* 8 (3/4), 1950 (85–111). [Sloven. croat.e.]

A detailed illustrated account of the best hand methods.

3078. MÖLLING, H. A. Rationelle Entrindungsmethoden. **[Rational methods of barking.]** *Holztechnik* 31 (1), 1951 (21). [G.g.] P.R.

A short survey of modern methods of log-barking.

3079. KIRKUP, A. **Bark peeling machines.** *Quart. J. For.* 45 (1), 1951 (36–8 + 2 photos).

Describes the American Hurricane post-peeling machine, which needs foundations, costs over £600, and is suitable for a permanent mill, and the Bezner peeler, which is easily transportable, costs only £80 for a one-disc model, and is suitable for ordinary estate use.

3080. BROMLEY, W. S. **Adams portable barker.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1135 (*B-7-d*), 1951. pp. 3.

The machine is a small drum, mounted on the back of a lorry, which barks logs as the lorry is moving and either discharges the barked wood as it goes or moves it all to a central point. The normal output of the barker is 12–15 cords of 5·25-ft. Southern Pine pulpwood a day. If the machine were stationary, it could bark 5–6 cords an hour. The capacity of the drum is ⅔ cord. More than 90% of the bark is removed from freshly cut Southern Pine, the remainder being loose and easily knocked off. The barked wood has been found acceptable by pulpmills. Southern hardwoods have also been barked successfully. The barker, which resembles a portable cement-mixer in appearance, has a stationary drum with steel lugs to move the logs, at suitable points inside the drum. A shaft with arms fixed to make 5 pockets in which the wood is carried, turning at *ca.* 50 revs./min., runs through the middle of the drum. The design could be adapted for other pulpwood lengths.

3081. HUBER, B. Physiologie der Rindenschälung bei Fichte und Eiche. **[Physiology of bark peeling in Spruce and Oak.]** *Forstwiss. Cbl.* 67 (3), 1948 (129–64). [G.]

[Cf. *For. Abstr.* 4 (121).] Extensive research into problems connected with peeling permitted the following conclusions: *Spruce*—(1) The peeling season begins later in mature timber than in pole or coppice timber. (2) Peeling is easier in dominants and trees of quick growth. (3) A delay in the onset of the peeling season is noticeably related to altitude at heights greater than 1,000 m., but at lower altitudes this factor is negligible. (4) In winter-felled wood, the peeling season begins later, ends earlier and gives lower yields of bark than standing timber. (5) Peeling qualities appear to depend on the formation of growth substances in the cambium simultaneously with the formation of growth substances in the buds, the process beginning at the crown of the tree and moving to the base. In girdled trees, therefore, peeling is always easier above the girdle, though in the first half of the growing season, *ca.* 75% of the stem below the girdle can be fairly easily peeled. (6) Resistance to peeling is lowest in late June and early July, after which it begins to increase, though in many cases resistance falls again at the beginning of August. The peeling season can be prolonged by girdling the stem at a height of 1 m. *Oak*—(1) The peeling season begins before flushing. (2) Cambial activity begins almost simultaneously throughout the stem and no difference in the peeling qualities of the upper and lower portions is noticeable, as with Spruce. (3) Length of the peeling season is shorter and more variable than in Spruce, much depending on the site and age of the tree. (4) The peeling season of Oaks can also be prolonged by girdling. (5) A comparison of Pedunculate and Sessile Oaks could not be made, as so much depends upon site.

3082. DEMOISY, R. G. **Tree poisoning facilitates bark removal.** *Circ. Inst. For. Prod. Wash.* No. 9, 1950. pp. 4.

In experiments on tree-poisoning methods, the Armstrong Forest Company found that the use of a weak solution (4 lb./gal. water) of Na_2HAsO_3 gave most satisfactory results in killing trees and causing bark separation. The tree is completely girdled during the growing season, using a special girdling axe that has one face ground off flat and one with the normal bevel, leaving an 8-in. bark-free belt which is

brushed with Na_2HAsO_3. A crew of 6 men treat an average of 120 cords a day, using a gallon of solution to 30–50 cords, at *ca.* 40 cents/cord. Pines, Oak, and Aspen peel readily after 3 months, followed by Basswood, Elm and Poplar. After the winter freeze, Cherry bark is very loose, bark has fallen from Beech and Maple, and Birch bark has started to disintegrate. It is estimated that only 4% of the original bark reaches the mill. More accurate data on this will be collected and published. Other advantages are that: pulpwood can be felled, peeled, and processed, all the year round; there is little damage by insects and fungi because of the As present in the tree; softwoods, having seasoned while standing, are lighter for handling and hauling by as much as 1,000 lb. per cord; there is no surface pitch; the wood is easy to split, if necessary, and damage to other trees during felling is slight because the dead branches break off easily.

3083. Klem, G. G. Kjemisk barking av traeer på rot. **[Chemical barking of standing trees.]** *Norsk Skogind.* 5 (1), 1951 (26–7). [Nor.] P.R.

The results of Canadian experiments [cf. *For. Abstr.* 11 (No. 1926)] are discussed. The probable cost of using the method in Norway is estimated to be below that of hand barking. No definite conclusions can, however, be drawn until experiments have shown whether the method is successful in Norway.

3084. Walters, C. S., Kulp, D. A., and Fox, H. W. **Stumps too wet to burn.** *For. Note Ill. agric. Exp. Sta.* No. 19, 1950. pp. 2.

As a result of unsuccessful attempts to burn hardwood stumps with KNO_3 and other chemicals [cf. *For. Abstr.* 11 (No. 1154)], borings were taken from 4 levels in 20 sound Black Oak stumps in November, March, April, July, August and September, in each case after warm, dry periods when it was reasonable to assume that the stump wood was dry enough to burn. For every month, the average moisture content of the stumps tested was above saturation point, and it is believed that it would be impossible to secure temperatures of sufficient intensity and duration to evaporate the free water and burn the wood, by the methods commonly recommended for eradicating hardwood stumps. In Illinois, therefore, the problem of burning dead, sound stumps which remain in the soil is probably analogous to that of burning green wood.

3085. McIntyre, A. C., and Mirantz, M. **Portable wood chippers have variety of uses.** *Soil Conserv.* 16 (6), 1951 (123–6).

Gives some examples of the use of portable chippers [cf. *For. Abstr.* 11 (No. 1933)], e.g. to turn orchard prunings into a mulch, and to provide litter from farm-woodland thinnings [cf. *For. Abstr.* 12 (No. 2624)]. The quality of manure produced from chip litter is discussed.

32.8. *Grading and Storage of Wood in the Rough*

See also *For. Abstr.* 12 (Nos. 3137, 3259, 3491).

3086. Kinghorn, J. M., and Webb, W. **Chemical control of ambrosia beetle.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (6), 1950 (3–4).

A small-scale experiment was carried out at Cowichan Lake to test the relative value of a number of treatments to protect logs in the forest from ambrosia-beetle attack. Preliminary results indicate that BHC sprays are a most efficient protection against bark-beetles, cerambycids and buprestids as well as ambrosia beetles. The sprays in question were BHC + benzene in fuel oil, BHC emulsion with methyl benzoate and Triton X–100 in water, and BHC emulsion with furfurol and Triton X–100 in water. The water emulsions appeared to be as effective as the oil solution, even after 2 months of moderate precipitation. Further analysis of the data is in progress.

32.9. *Transport*

3087. Heiskanen, V., and Kantola, M. Ehdotus puutavaran kuljetuksen jaotteluksi. **[Proposed new classsification of [terms in] timber extraction.]** *Metsät. Aikak.* 1950 (3/4), (87–93). 18 refs. [Fi.e.]

In view of the increasing elaboration of timber transport everywhere, the author makes proposals, based largely on Finnish conditions, for unifying the classification and terminology of the different stages, which vary considerably between countries. He recognizes 4 main stages between stump and overseas market, each of which he defines and subdivides.

3088. ANKER-RASCH, O. Transport-problemene i skogbruket. **[Transport problems in forestry.]** *Norsk Skogind.* 5 (1), 1951 (12–6). P.R.

Discusses briefly: the purpose of a transport committee set up a year ago by the Norwegian Forestry and Forest Industries Research Association; railway transport with particular reference to the provisions of suitable wagons and the use of loaders; transport by lorry; and floating.

3089. DEMOISY, R. G. **Packaged logs.** *Circular, Institute of Forest Products, Seattle, Washington* No. 6, 1950. pp. 8.

Woven wire rope and steel banding are both used, often interchangeably, for packaging. The wire rope can be used again and again, the steel banding, if not exposed to salt water or other corrosive action, may be used several times. Costs per running ft. are given for bandings ranging in size from 0·75 × 0·035 in. to 2 × 0·50 in. Banding small logs or cordwood before loading on the lorry simplifies further handling and reduces costs. Larger material may be banded before loading, on the truck immediately after loading, or at a reloading station. When logs are to be rafted the bands are not stretched as they are for land transport, because the buoyancy of the logs takes up any slack. Banding logs for rafting reduces loss by sinking, lessens the danger of losing logs in rough weather, allows the storage or rafting of more logs in a given area, makes navigation easier and allows increased towing speed. There are a few disadvantages: Cottonwood logs were found to lose their bark and to spill out of the band; there is a danger of grounding in shallow water; and steel straps rust after some time in water. Extimated costs from some logging firms using steel banding are given.

32.91. Land Transport

See also *For. Abstr.* 12 (Nos. 3469, 3537).

3090. BROWN, G. S. **Notes on mechanised logging in the Philippine Islands.** *Malay. Forester* 13 (4), 1950 (203–10 + 4 photos).

3091. GRANVIK, B. A. Tutkimuksia moottoriajoneuvojen käyttömahdollisuuksista järeän puutavaran vetäjinä sekä autovarsiteiden rakentamisesta ja hoidosta. **[Investigations into the possible use of motor vehicles for haulage of large-size timber and the building and maintenance of main lorry-haulage roads.]** *Julkaisu, Työtehoseura, Helsinki* No. 53, 1949. pp. 136. 52 refs. [Fi.e.]

Results are presented of an investigation carried out in Sweden in the winter of 1945–46. (1) *Haulage*: The most efficient method is for each vehicle to draw 3 pairs of sledges. Of the vehicles studied, haulage lorries gave better results than wheeled or caterpillar tractors. (2) *Loading and unloading*: Teams of 2 men are normally used but teams of 3 may be preferable in view of the heavy nature of the work. Loading time for a 2-man team was 0·16 min./cu. ft. Loading ramps were of great value. Unloading time with one man working was 0·17 min./cu. ft. (3) *Roads*: Reinforcement of the roadbed and maintenance work should be carried out as early as possible. The numerous illustrations, graphs and tables have legends in Finnish and in English.

3092. MCCOLL, B. J. **Problems in mechanical hauling from the stump.** *Pulp Paper Mag. Can.* 52 (1), 1951 (99, 101–2, 105–6). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1102 (*B*-8-*a*) Appendix C.)

The comparative costs of hauling by crawler tractor, light farm tractor, snowmobile, 3-ton lorry and horse are shown in tables. Although costs for horse haulage are high and output is relatively low, the ability of the horse to move loads over poor haulage roads gives a total cost for hauling from the stump that is difficult to better by mechanical hauling.

3093. MONTGOMERY, R. H. **Farm tractor haul.** *Pulp Paper Mag. Can.* 52 (1), 1951 (109–10). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1103 (*B*-8-*f*) Appendix D.)

A comparison of costs for tractor hauling with sleighs and for hauling by lorry showed that in the 1950 season the former and in 1949 the latter method was more expensive. Tractors with 5-ft. hauling sleighs were quite efficient on well packed roads, but of doubtful value on soft snow.

3094. AMEY, G. Le tracteur porte-treuil et ses possibilités en terrain difficile. **[The winch-bearing tractor and its performance under heavy-going conditions.]** *Bois For. Trop.* No. 16, 1950 (354–60). [F.e.span.]

The haulage power of a tractor is soon reduced in hilly country, but this can be offset by the use of a winch. This necessitates increasing the ground adherence of the tractor, which may be achieved by the use of water-filled tyres and anchorage by means of a spade-like device [cf. *For. Abstr.* 11 (No. 394)], or by direct fastening to some fixed point such as a tree stump. The use of a tackle-block enables great haulage power to be obtained from relatively light tractors used in this way. *From author's summary.*

3095. Fobes, E. W. **Jack-knife sulky.** *Rep. U.S. For. Prod. Lab., Madison* No. R1637–41, 1950. pp. 1 + 2 photos. P.R.

Describes a jack-knife device for use with farm tractors not equipped with winches. As the tractor pulls ahead, the device lifts the load, thus reducing the sliding resistance.

3096. McNally, J. A. **Farm tractor sloop hauling.** *Pulp Paper Mag. Can.* 52 (1), 1951 (110). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1105 (*B*-8-*f*) Appendix F.)

The potential production by a tractor and light sloop with a self-loader on a 6,000-ft. haul was calculated from time studies to be 27 cords.

3097. Horncastle, D. C. **Hauling four-foot wood with self-loading sloop.** *Pulp Paper Mag. Can.* 51 (13), 1950 (128, 130–1). (*Woodl. Sect. Index Canad. Pulp. Pap. Ass.* No. 1100 (*B*-8-*d*).)

3098. Thompson, B. **Sloop hauling in relation to forest management.** *Pulp Paper Mag. Can.* 52 (1), 1951 (96, 98). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1101 (*B*-8-*d*) Appendix B.)

Sloop hauling calls for roads that can be used all the year round; one camp can serve an area where 3 were needed before, and this single camp can be made more permanent. Piles of logs remain as a unit until delivered at the river or final landing, with a minimum of wastage. There is no evidence that sloop hauling either reduces or improves the possibilities of natural regeneration. Fire hazard is increased by the presence of more men and vehicles in the woods during the summer, but most of the areas are accessible by road before felling starts, and outbreaks of fire can be dealt with quickly.

3099. Mikheev, S. D. Vliyanie traktornoy trelevki na usloviya lesovozobnovleniya. [**The influence of tractor skidding on conditions for regeneration.**] *Lesn. Khoz.* 1950 (2) (33–8). [Russ.]

Gives results of observations on the effects of tractor skidding in summer (16 plots) and winter (4 plots) on felling areas in typical 100- to 120-year-old Pine and Spruce stands of the coniferous forest zone. Winter skidding over the snow had no noticeable effect on conditions for regeneration. In summer skidding, the surface soil over about 20% of the felling area is disturbed to a varying degree: vegetation and litter are ground into and mixed with the mineral soil in a layer 5–15 cm. deep. Some compaction of the soil occurs to a depth of 40–50 cm., reaching a maximum at 10–20 cm., even though the surface soil may be loosened. Sand is compacted to about the density of sandy loam, sandy loam to about that of light clay-loam, and light clay-loam to that of heavy clay. On these soils such compaction does not prevent natural regeneration on the greater part of the disturbed area. Heavy clays, however, are compacted to a degree which precludes regeneration for a long period. Permeability of the soils to water shows corresponding decreases, but it is not considered that tractor skidding contributes materially to water-logging and bog formation. On felling areas with dissected relief, considerable trail erosion may occur if tractor skidding is done up and down the slopes. Factors favourable to regeneration are the mixing of the surface soil horizons and the poorer growth of ground vegetation on skidding trails, for a long time (up to 7 years) after felling, than on undisturbed soil. On the whole, it is concluded that tractor skidding generally favours rather than discourages natural regeneration in these forests.

32.92-4. Water Transport

3100. Côté, J. Étude sur la débâcle. [**A study of the opening dates of rivers and lakes in the Province of Quebec.**] *Bull. Bur. Mét. Québec* No. 17, 1950. pp. 26 + 9 dgms. 17 refs. [F.]

By analysing data collected over a period of ten years at the meteorological station at Duchesnay, 25 miles from Quebec, the author deduces that the accumulated temperature [cf. *For. Abstr.* 9 (No. 1653)] at which ice-break occurs in that region is 320·4°.

3101. WHITTAKER, J. E. **Use of the detonating fuse 'Primacord'.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1114 (*B*-9-*a*), 1950. pp. 4.

The Primacord-Bickford detonating fuse, obtainable from Canadian Lumber Industries Limited, is a high-velocity detonating agency contained in a waterproof textile covering. It acts as detonator to a number of explosive charges to which it is attached, and the charges go off practically simultaneously. Methods of using it with one or several charges are illustrated with diagrams. It has been successfully used in breaking up log jams.

3102. MITYAKOV, N. Opŷt ispol'zovaniya traktorov i lebedok na splave. **[Experiment on the use of tractors and winches in floating operations [to salvage stranded timber].]** *Lesn. Prom.* 1950 (2), (18). [Russ.]

Briefly describes the successful use of S-80 tractors for dragging stranded timber from banks into the water, and of TL-3 winches, mounted on barges together with PES-60 power generators to supply the necessary current, to re-float timber stranded in shallow water. For the latter purpose it is necessary to guy the barges to the bank, and to pull the barge into deeper water from time to time by reeling in the guys on to the third drum of the winches, since otherwise the timber being hauled in tends to push a sand-bar in front of it, which may ground the barge.

3103. GLIDDON, C. **Floating log flume.** *Pulp Paper Mag. Can.* 52 (1), 1951 (94–5, 106).

Describes with illustrations a floating flume, V-shaped in cross-section and held in position by wire ropes to the shores, which guides logs from the main channel of the Ottawa river into a log slide at the 60-ft. drop in the river created by the dam at the Bryson Hydro-electric plant of the Gatineau Power Company.

3104. VILLIKKA, P. Erottelun läpäisykyky. **[Sorting efficiency in floating.]** *Metsät. Aikak.* 1950 (5), (141–4, 147–50). [Fi.e.]

Investigations of sorting operations carried out by Metsäteho in summer, 1949, showed that the sorting of pitprops and pulpwood was the most difficult and time-taking. Suggestions for improving performance are given.

3105. YRJÖ-KOSKINEN, Y. O. T. Puutavaran merikuljetuksesta ja niputeksesta Länsi-Suomessa. **[On sea floating and bundling of timber in West Finland.]** *Metsät. Aikak.* 1950 (5), (129–32, 135–40). [Fi.e.]

A general, illustrated account, with special reference to the Gulf of Bothnia, the main methods, and their limitations. Tug-towed rafts of the floating-boom type are confined to short distances and sheltered water. Rafts of bundled material are general, pulpwood being penned in booms in addition; but most pulpwood is lighter-borne, with crane or manual loading. Various types of mechanical bundling apparatus are described, e.g. the Lukanen pulpwood bundler which can handle *ca.* 550 cu.m./8 hours.

32.96. Loading and Unloading

See also *For. Abstr.* 12 (Nos. 3091, 3096–7).

3106. RAKHMANOV, S. I. Raschet pogruzochnŷkh strel. **[Calculation of [A-frame] loading derrick arms.]** *Lesn. Prom.* 1950 (2), (9–12). [Russ.]

Gives details of the mathematical procedure necessary for designing a simple, non-rotating type of derrick arm for skidding and loading, built of rough wood on the logging site. A maximum permissible stress of 100 kg./sq. cm. in compression parallel to the grain is assumed.

33. CONVERSION AND PRESERVATION OF WOOD

3107. BROWN, N. C. **Forest products: the harvesting, processing, and marketing of materials other than lumber, including the principal derivatives, extractives, and incidental products in the United States and Canada.** John Wiley & Sons, Inc., New York. 1950. pp. xv + 399. 13 refs. Price $5.00.

Contains sections on:—economics and general considerations (including methods of increasing utilization and reducing waste at all stages); building materials; chemically derived products (wood pulp, naval stores, wood distillation products, extractives, rubber, maple sugar and syrup); wood containers (cooperage, boxes and crates); mechanically reduced products (excelsior, wood flour, sawdust, shavings, and molasses for stock feed, hardwood dimensions and related products, and wood densification); wood as fuel (fuelwood, charcoal, briquettes and wood gas); and miscellaneous products (including bark, Christmas trees,

decorations and ornamental plants, fruits, nuts and tree seeds, sports equipment, shuttles and bobbins). There is a glossary of forest-products terms and an extensive bibliography.

3108. ZIERAU, E. Urwaldnutzung und Holzverwertung in Anatolien. **[Exploitation of virgin forest and wood utilization in Anatolia.]** *Weltholzw.* 3 (1), 1951 (12–8). [G.] P.R.

33.1. *Mechanical Conversion excluding the Manufacture of Mechanical Pulp*

3109. SMITH, J. T. **Exploitation and milling of smaller timber in Scotland, especially softwood thinnings.** *Emp. For. Rev.* 29 (4), 1950 (334–8 + 8 photos). 3 refs.

3110. PELLY, R. S. **Forest industries—Sierra Leone.** *Emp. For. Rev.* 29 (4), 1950 (351–60 + 4 photos).

A general account of the development and present operations of the Forest Industries branch of the Forest Department, which carries out all operations from logging to manufacture and marketing; with a more detailed account of sawmilling.

3111. KOLLMANN, F., and KEYLWERTH, R. Beiträge zur Kraft- und Wärmewirtschaft in der Holzindustrie. **[Power and heat economy in the timber industry.]** *Schriftenreihe Holzfragen der Gegenwart, Stuttgart* No. 1, 1950. pp. 95. 126 refs. [G.] P.R.

Contains sections on power consumption in woodworking and wood processing; modern methods of drying; costs and economy of artificial drying; principles of high-temperature drying; simultaneous drying and impregnation with hot oil; calculation of the duration of artificial drying; the 'drying gradient' and control of drying plants; improvement of wood by application of heat, and H.F. technique in the timber industry.

3112. LISTER, S. **Conversion.** Lomax, Erskine & Co. Ltd., London. 1951. pp. 6 + 114. P.R.

Section 1 of the Manual of Machine Woodworking, dealing chiefly with the felling and primary breakdown of the tree, the various types of saw used, loading, and handling at the mill; numerous illustrations.

3113. PAVITT, H. A. **The use of steel in the cutting of wood.** *Wood Prod.* 55 (12), 1950 (42, 44).

A brief account of different steels used for saws, and planer, veneer, chipper and hog knives.

3114. Hartmetall-Maschinenwerkzeuge für Holzbearbeitung. **[Hard-metal machine tools for wood machining.]** *Holztechnik* 31 (1), 1951 (2–6). [G.] P.R.

Description of the use of 'hard metals' (tungsten, tungsten carbide, etc.) for various machine tools used in wood machining. Data are given for the efficiency, profitableness, and maintenance of these tools.

3115. **How we saved $45.27 per carload of lumber.** *Modern Materials Handling, Boston* 5 (11), 1950 (23–4). D.S.I.R.

Describes (in the form of an interview) the savings, both in labour and lumber-car requirements, brought about by the introduction of a 'unit-load' system at General Electric Company's Pittsfield (U.S.A.) Works.

Use of Wastes

See also *For. Abstr.* 12 (Nos. 3184, 3188–90).

3116. STAMM, A. J. **Chemical utilization of wood: utilization of wood waste and bark.** *Rep. U.S. For. Prod. Lab., Madison* No. R1770, 1949. pp. 16. 56 refs. P.R.

A discussion of potential uses, mechanical or chemical; integrated mechanical and chemical utilization may be the most efficient.

3117. CARPENTER, R. D. **Volume of heavy waste at Southern Pine sawmills.** *Sth. Lumberm.* 182 (2277), 1951 (62, 64).

Presents the results of a study made between October 1948 and February 1950 to estimate the amount of wood waste suitable for pulp, produced by Southern Pine sawmills.

3118. BRYANT, L. H. **The utilisation of sawmill waste.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 4 (10/12), 1950 (7–10). P.R.

Discusses the use of sawmill waste as fuel, absorbent, and heat insulator, and as material for drying and polishing, for composition products and for packing. Apart from these direct

uses, sawmill waste is used as wood flour (filler) in linoleum and moulded plastics, and for manufacturing wallboards and artificial cork (from the bark of *Melaleuca leucadendron*). Essential oils, tannins, sugars, alcohols and proteins can also be obtained from sawmill waste.

3119. SHERRINGTON, C. E. R. **Dining car fuels: use of compressed sawdust.** *Transport Research Quarterly, London* No. 1, 1950 (46–7). P.R.

A brief note on the manufacture and use (in America) of 'Pres-to-Log'. [Cf. next abstract.]

3120. HOSSACK, G. W. **Charcoal briquettes from wood waste.** *B.C. Lumberm.* 34 (12), 1950 (116, 118, 120, 122). 17 refs.

A survey of different processes including the Pres-to-log [cf. *For. Abstr.* 6 (p. 110)] and the Basore-Moore [cf. *For. Abstr.* 5 (p. 127)].

3121. LARUE, P. La sciure. **[Sawdust.]** *Bois & Résin.* 32 (1548), 1951 (1).

A brief account of a method of manufacturing concrete blocks developed in Algeria, using one part by volume of cement, one of clay, and 3–7 of mixed sawdust and cork waste, with or without one part of diatomite (for non-combustibility). Pine, Fir, and Larch sawdust was used. The slabs are used for building and paving blocks.

3122. WOHLETZ, L. R. **[The use of Fir sawdust as a mulch in a Pear orchard.]** Excerpt from memorandum by R. D. Hockensmith, Chief, U.S. Soil Conservation Surveys Division, to all Regional Chiefs. 2 June, 1948. pp. 1. P.R.

Claims fine yields, good water penetration, and the saving of one irrigation.

3123. MCINTYRE, A. C. **Wood chips, water and soil.** Soil Conservation Society, U.S.A. 1950. pp. 11 + 2. 26 refs. P.R.

Discusses the rôle played by fragmented wood as a soil conditioner, as a mulch for crops, as a soil covering on yards, roads etc., for composting, and for soil and water conservation.

33.12. Joinery, Furniture and Cabinet Making, Wood Bending

3124. **The Cabinet-Maker Yearbook 1951 incorporating the buyers' guide and trade mark section and including a guide to current prices.** Benn Brothers Ltd., London. 1951. pp. 565. P.R.

3125. **The profile cutter.** *Timb. Tr. J.* 195 (3873), 1950 (561).

3126. TONG, M. P. **Improvements in rotatable cutting tools particularly for wood-working.** *Brit. Patent* No. 647,437, Dec. 13, 1950. pp. 4 + 4 dgms. P.R.

Improvements are claimed in the block (or head) in which one or more cutters are mounted detachably, and also in the means for mounting the cutters in the block.

3127. [DAVIS, E. M.] **Forest Products Research Clinic. Problem No. 1. What are the most efficient angles for cutter head knives on shapers and molders for best results in high production?** *Wood-Worker, Indianap.* 69 (11), 1951 (62). P.R.

3128. PECK, E. C. **Bending solid wood to form.** *Rep. U.S. For. Prod. Lab., Madison* No. R1764, 1950. pp. 29 + 12 photos, 4 dgms., 3 tbls. 4 refs. P.R.

Presents results of research on wood bending and related information acquired at Madison and other laboratories over a period of years, together with investigations and observations in furniture factories, ship and boat yards and other plants. Contains sections on selection of material, seasoning, machining of bending stock, plasticizing, bending, drying, and fixing the bend. An 8-page appendix deals with the mechanics of bending.

3129. HALE, J. D. **The formation of permanent bends in solid wood.** Forest Products Laboratory, Canada. 1948. pp. 6 + 5 photos. P.R.

An outline of some practical details of wood bending.

3130. CHUDNOFF, M., and WANGAARD, F. F. **The steam-bending properties of certain tropical American woods.** *Tech. Rep. Yale Sch. For.* No. 6, 1950. pp. 8 + 1 gph., 2 tbls. 7 refs.

Gives the results of experimental steam bending of 16 tropical American woods, in addition to White Oak, which was included for comparative purposes. Evaluation of the quality of bend is attempted on the basis of (1) visual inspection for defects and (2) strength tests of bent members, as compared with the strength of untreated wood.

3131. **Wood bending.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (16 + 1 photo).

The bending properties of numerous exotic timbers, including *Terminalia ivorensis*, *Albizzia ferruginea* and *Daniella ogea*, have been investigated. None of the tropical species tested in solid form possessed bending properties comparable with Beech or Ash. The limiting radii of curvature of thin laminae from these species were also determined to assess their value for laminated bending. Most of them proved satisfactory, but none was as good as Beech. Tests failed to confirm a claim sometimes made by hockey-stick manufacturers that bending properties of Ash are improved by storing in log form for a period before conversion. The possibilities of setting solid bends by R.F. heating have been investigated. Solid bends of 1¼-in. square Beech, Ash and Elm could be set in 10 minutes by this method; Oak proved refractory, needing setting periods of 1 to 2 hr.

3132. Heinrich, K. Das Biegen von Sperrholz über beheizte Formen. [**Bending of plywood on heated forms.**] *Holz* 4 (10), 1950 (197–8). [G.] P.R.

Gives practical hints for bending of plywood. The surface temperature of the bending form varies from 160 to 220° C. for a bending angle of 180°, the higher temperatures being used for greater thicknesses. The heating time, in minutes, for a bending angle of 180°, should be equal at 200° C. to double the thickness of the plywood expressed in mm. The time of the bending process itself, in minutes, equals *ca.* $s^2/3$, where s is the thickness in mm. The smallest radius of curvature is *ca.* 10–15*s* when the grain of the top veneer layer is perpendicular to the bending axis, and *ca.* 6–8*s* when it is parallel to the axis.

3133. Il'inski, S. A. Dopuski i posadki dlya vzaimozamenyaemŷkh detaley v derevoobrabotke. [**Tolerances and tightnesses of fit for interchangeable parts manufactured from wood.**] *Lesn. Prom.* 1950 (2), (19–22). [Russ.]

Describes a system for standardizing the tolerances and 'fit' of wooden parts so as to minimize the time spent on adjustments of fit during assembly. The system has worked well in three large woodworking factories making furniture, building components and aeroplane parts.

3134. Graham, P. H. **Fine finishing, fine sanding are inseparable operations.** *Wood-Worker, Indianap.* 69 (10), 1950 (24–6). P.R.

A review of practical knowledge.

3135. Jobson, A. **Chair-bodgers of the Chilterns.** *Ctry. Life, Lond.* 106 (2758), 1949 (1582–3). O.B.

Tools and methods used by craftsmen making Windsor chairs.

33.13. Cooperage

See also *For. Abstr.* 12 (No. 3223).

3136. Hankerson, F. P. **The cooperage handbook.** Chemical Publishing Co., Inc., Brooklyn. 1947. pp. 6 + 182. P.R.

33.15. Manufacture and Use of Veneers and Laminated Wood. Improved Woods. Laminated Materials other than Wood. Glues and Gluing

33.15.1. *Manufacture of Veneers and Laminated Wood*

See also *For. Abstr.* 12 (Nos. 3131–2, 3151 *et seq.*, 3196, 3209, 3225).

3137. Saks, E. V. **Good peeler bolts are basis for fine veneer.** *Veneers & Plyw.* 45 (1), 1951 (10–2). P.R.

Footage obtained from trees, including certain over-mature trees, can be increased by applying modern principles of grading. Standards are described for acceptable and reject logs.

3138. **Veneer cutting and drying properties. Cottonwood.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1766–3, 1950. pp. 4. 4 refs. P.R.

Contains recommended lathe settings and average drying schedules, based on tests on *Populus trichocarpa* and *P. angustifolia.*

3139. Ellwood, E. L. **The kiln drying and reconditioning of rotary peeled 'Ash' Eucalypt veneer.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 182, 1950 (1–2).

An investigation into the causes of the severe degrade usually met with in manufacture of rotary-peeled *Eucalyptus regnans* veneer, showed that this was due to collapse and seasoning defects during the first stages of seasoning. Schedules for kiln seasoning and results of a study of the value of steam reconditioning of veneer, are presented. It is claimed that by using new kiln schedules and reconditioning, a commercial firm saved *ca.* 10,000 sq. ft. veneer daily that had previously been wasted.

3140. ARMSTRONG, J. B. **Softwood plywood: some manufacturing problems.** *B.C. Lumberm.* 34 (11), 1950 (50, 96, 98, 100).

3141. HYLER, J. E. **Cold pressed plywood. [Equipment and methods.]** *Sth. Lumberm.* 181 (2268; 2270; 2273), 1950 (63–4, 66; 53–4, 56, 58; 341–2, 344, 346).

3142. BARNES, J. A. **Controls outlined for hot pressing.** *Sth. Lumberm.* 181 (2273), 1950 (175–7).

Discusses the defects that may be caused by excessive moisture content and glue spread, too long or too short assembly time, excessive heat and pressure during hot pressing, and their remedies.

3143. PERRY, T. D. **The humble crossband.** *Wood Prod.* 55 (12), 1950 (29–33).

Discusses the function, selection, manufacture and assembly of the veneers between face and core, particularly those in a 5-ply construction with a thick wood core.

3144. MILLER, D. G. **The manufacture of lumber-core plywood.** *Timber of Canada* 10 (3; 4), 1950 (19–21, 65–6; 72, 80, 82, 84).

Discusses selection of timber for cores and veneers, and methods of assembly, gluing and drying.

3145. PETERSON, R. B. **Core panels without waste.** *Lumberm.* 78 (1), 1951 (68, 70, 73).

Discusses the advantages of patching core stock with a machine that removes the defect by boring, produces a plug of the right size, treats the hole with a resin glue and inserts the plug with the grain running parallel with that of the core.

33.15.2. *Use and Properties of Plywood and other Laminated Wood*

See also *For. Abstr.* 12 (Nos. 3241, 3256).

3146. KRAEMER, O. Güte- und Kennzeichnungsrichtlinien für Sperrholz. **[Principles for the grading of and conventional abbreviated designations for plywood.]** *Holztechnik* 30 (11), 1950 (313–14). [G.] P.R.

Describes the history of the German regulations for the grading and marking of plywood since 1933. In order to obviate the rigidity of official standards, the post-war regulations will, as heretofore, be published in the form of guiding principles. On the other hand, testing methods are the subject of definite standards, e.g. DIN 53255 'Testing of bonding strength in veneer boards and blockboards' and DIN 53256 'The bonding strength in veneer boards following fungus attack'. It is suggested that the new grading regulations should deal with 3 timber groups (foreign, European hardwood, and European softwood), that dry-strength tests be dropped, that wet-strength requirements be raised *ca.* 50%, and that the mycological test be included in the boiling-strength test. Tentative grading specifications for plywood are appended.

3147. COUSINS, F. W. **Determining stress in glued joints by photo-elastic method.** *Timber News* 58 (2127), 1950 (29–32).

3148. FREAS, A. D. **Studies of the strength of glued laminated wood construction.** *Bull. Amer. Soc. Test. Mater.* No. 170, 1950 (48–59). 3 refs. P.R.

The studies discussed were initiated at Madison in 1934 to get data on the relations between the strength properties of glued laminated structural members and the factors affecting the strength of such members. The initial research dealt primarily with curved members. The effects of such factors as curvature, end joints in laminations, defects, and methods of applying gluing pressure were studied. During the recent war, the limitations of available data were recognized and a programme of tests on beams and columns was begun, including more extensive and detailed tests of the effects of end joints and knots than those previously made. In addition, the effects of these factors on compression members were

studied. The data from both sets of studies have been used in formulating recommendations for procedures in the design of glued laminated structural members. *From author's synopsis.*

33.15.4. *Laminated Materials other than Wood*

3149. Norris, C. B., and Kommers, W. J. **Short-column compressive strength of sandwich constructions as affected by the size of the cells of honeycomb-core materials.** *Rep. U.S. For. Prod. Lab., Madison* No. 1817, 1950. pp. 7 + 1 photo, 5 gphs., 3 tbls.

Results are given of an investigation on sandwich constructions, containing aluminium facings combined with core materials consisting of end-grain Balsa, Sitka Spruce, cellular hard rubber, or resin-impregnated paper honeycomb.

3150. Thurston, A. P. **Improvements relating to laminated structural materials such as plywood.** *Brit. Patent* No. 603,078, June 9, 1948. pp. 5 + 7 dgms. P.R.

A laminated material consisting of alternate sheets of wood and layers of glass fibres permanently united to form an integral unit.

33.15.5. *Glues and Gluing*

See also *For. Abstr.* 12 (Nos. 3141–2, 3144, 3230, 3260).

3151. Narayanamurti, D., and Chimma, A. S. **Studies on adhesives. Part XIV. The use of the proteins of *Lathyrus sativus* for wood adhesives.** *Indian For. Leafl.* No. 119, 1949. pp. 21.

Adhesives having high dry and wet strengths, long working life, assembly time, etc., were prepared from proteins extracted from the seeds of *L. sativus*, with the addition of water and lime. *From authors' summary.*

3152. **'Aerolite' 300 miscellany.** *Bull. Aero-Res., Duxford* No. 96, 1950. pp. 4. P.R.

An illustrated account of the use of 'Aerolite' 300 for the manufacture of musical instruments, kitchen units, toolboxes, ladders, signboards, furniture, and picture frames.

3153. **Veneering with 'Aerolite' K.** *Bull. Aero-Res., Duxford* No. 97, 1951. pp. 5. P.R.

An illustrated account of the use of 'Aerolite' K by several leading manufacturers in the woodworking industry.

3154. Gibson, W. R., and Pearson, G. E. H. **Aminoplastic adhesives in the woodworking industries.** *Transactions, Plastics Institute, London* 17 (29), 1949 (49–61). L.S.

Discusses the principles of plywood construction, various applications of the amino adhesives in this field, methods of applying the adhesives, and heat curing processes. Existing relevant specifications are given. *From authors' summary.*

3155. Enzensberger, W. 'Pressal'—ein Kunstharzleim für die Holzindustrie. ['**Pressal'—a synthetic-resin glue for the timber industry.**] *Holztechnik* 31 (1), 1951 (6–8). [G.] P.R.

Describes the properties, uses and methods of applying 'Pressal', a condensation product obtained from melamine and formaldehyde.

3156. Yavorsky, J. M. **R.F. properties of resin adhesives.** *Wood, Chicago* 5 (11), 1950 (22–3). 2 refs. P.R.

Results are given of measurements of dielectric constants and R.F. conductivities for various commercial resin glues, carried out with wet mixes. Very great differences were found between various glues, which explains why the rate of R.F. heating and the loading characteristics vary markedly from glue to glue.

3157. Peterson, R. W. **The application of dielectric heating in the woodworking industries.** *B.C. Lumberm.* 34 (12), 1950 (38–40, 92, 94, 96, 98).

3158. Mann, J. W., and Russell, G. F. **Radio-frequency parallel bonding.** *Brit. Patent* No. 647,045, Dec. 6, 1950. pp. 3 + 3 dgms. P.R.

Corrugated electrodes are used for the purpose of causing a concentration of R.F. field lines of force to pass through certain portions of adhesive layers perpendicularly disposed between them.

3159. Lacey, P. M. C., and Howe, H. A. **Radio-frequency glue-setting: summary of results of experiments on the glueline method.** *Wood* 16 (2), 1951 (50–8).

3160. LACEY, P. M. C., and HOWE, H. A. **Low voltage heating for glue-setting over large areas.** *Wood* 16 (1), 1951 (10–4). 2 refs.

The problems of irregular heating, and difficulties in handling the necessary currents of 1,000 ampères and more, when metal sheet elements are used to accelerate glue setting for areas more than a few inches wide, have been investigated at Princes Risborough, and a process for full-scale veneering and similar operations has been evolved. Uniformity is obtained by choice of suitable materials for sheet elements; resistance alloy sheet and stainless steel gave the best results. Iron in the form of woven wire mesh is suitable, though less strong, when a smooth surface is unnecessary. The use of sufficiently large current-distributing electrodes, whose size can be calculated from formulae given, also helps to ensure uniform heating. The large currents may conveniently be carried by water-cooled cables for which small quick-acting connectors have been developed.

3161. **Special heating methods for setting glues: mains voltage heating.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (24).

A method is described of adapting single-daylight cold presses to hot-press work at low cost.

33.17. Sawmilling and Machine Planing

3162. KNEŽEVIĆ, M. Određivanje mesta strugare na bazi transportnih troškova. [**Determining the best position for a sawmill on the basis of transport costs.**] *Glasn. šum. Fak., Beograd* No. 1, 1950 (231–62). [Serb.e.]

3163. TURNBULL, R. F. **Some American sawmilling practices significant for Australians.** *Aust. Timb. J.* 16 (7), 1950 (503, 505, 507, 509, 511, 513–4, 547–8).

3164. TOLLE, S. W. **Relationship of small permanent-type sawmills to better forest utilization in the northeast.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (58–62). P.R.

Account of the small permanent mill and its development against the background of lumbering in the north-eastern U.S.A.

3165. KENNEDY, W. B. **Time- and labor-saving kinks.** *Sth. Lumberm.* 182 (2277), 1951 (66, 68).

Describes some devices developed in small sawmills, including a metal stake to replace the wooden 'bumper' blocks often used to hold logs in place on bolsters.

3166. CARPENTER, R. D. **It's really portable—the Anders-Crosby mobile sawmill.** *Sth. Lumberm.* 181 (2273), 1950 (247–50).

The unit is complete with powered log ramp, standard circular sawmill, sawdust chain, conveyor rolls, edger and power unit, all mounted on a 12-ft. chassis with 6 dual wheels. The power unit supplies power for moving as well as for sawing. The mill produces square-edged but not edge-trimmed timber. It can cut large Pine and hardwood logs, and log size is limited only by the 52-in.-diameter saw. The unit can be used for making two-by-fours and other structural timber as well as sleepers and other small dimension timber. The description is illustrated.

3167. **Log turners.** *Timberman* 52 (2), 1950 (122–3).

Discusses various types of equipment used for turning logs on the saw carriage.

3168. A/S MYRENS VERKSTED, OSLO. **Improvements in or relating to arrangements for varying the work feed velocity in machines [used in sawmills].** *Brit. Patent* No. 644,995, Oct. 25, 1950. pp. 3 + 3 dgms. P.R.

3169. SASIN, J., and KNEBEL, R. (to Tatra, Narodni Podnik, Koprivnice). **Improved arrangement for feeding boards and planks, more particularly to planing machines.** *Brit. Patent* No. 644,757, Oct. 18, 1950. pp. 2 + 9 dgms. P.R.

In this arrangement the boards are passed between pairs of rollers, the lower roller being an ordinary rotary cylinder while the upper thrust-roller is a solid of revolution having a bulged-out curved surface.

3170. **Sawing and machining.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (24–5).

A series of experiments has been carried out with saws of 26-in. diameter, carrying from 20 to 80 teeth and with feed speeds up to 100 ft./min. The relation of tooth pitch, depth of cut and feed speed to the power required by the

saw and the feed resistance, has been determined for Scots Pine and Lime. The power demand decreased with number of teeth—i.e. as the pitch increased—and saving of power of nearly 40% resulted from a reduction in the number of teeth over the whole range. Power demand increased with the feed speed, but in a relation involving a saving of energy (KWH/100 sq. ft. of cut surface) as the speed was raised. Increase in the depth of cut resulted in an increased power demand and in an increase in power consumption. Preliminary experiments in rotary planing have been concerned with the effect of varying feed speed on the power required in cutting and the resistance to feeding at constant spindle speed and normal cutting angle of 30°. A relationship between these factors somewhat similar to that in ripsawing was found in planing Lime; 20% less power was needed for quarter-sawn than for flat-sawn Lime.

3171. Skoglund, C. Spänningar och svängningar i roterande sågklingor. [**Stresses and vibrations in blades of circular saws.**] *Medd. svenska TräforsknInst.* (*Trätekn. Avd.*). No. 12*B*, 1950. pp. 37. 11 refs. [Sw.e.] P.R.

Formulae based on experiments are given for calculating the stresses caused by rotation and by rise in temperature and the critical vibrations in saws of different thicknesses, diameters and collar diameters.

3172. Proeger, F. Kräftespiel am Kreissägeblatt und Rückschlag. [**Play of forces in the circular saw blade and kick-back.**] *Holztechnik* 30 (12), 1950 (343–5). [G.] P.R.

A general analysis of forces active during sawing, and its application to conventional (many teeth) and modern (few teeth) circular saws.

3173. **Sawing of refractory timbers.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (25–6).

The use of extra-hard saw teeth and methods of modifying the cutting action of teeth on ordinary saws are discussed.

3174. **Trimmer saw spacing.** *Timberman* 52 (3), 1951 (196).

Factors affecting the spacing of saws in a multiple-saw trimmer are discussed and a method of calculating spacings required to give lengths evenly trimmed is given.

3175. Malcolm, F. B. **Custom planing facilities for farm lumber.** *Sth. Lumberm* 181 (2271), 1950 (52, 54–6).

Describes some mobile planing units used in the U.S.A.

3176. **Aspects of dimension manufacture.** *Timber of Canada* 11 (5), 1951 (21–3 54).

Discusses machinery, the selection of the most profitable clear lengths and widths for ripping or cutting to length, the advantages of marking, and the use of length rules and standard patterns.

3177. Darwin, W. N., and Cobb, B. C. **Effect of log size and grade on production rate and lumber grade in Shortleaf Pine.** Tennessee Valley Authority 1949. pp. 7 + 1 photo.

Includes a check of mill tally against ¼-in. Log Rule.

3178. Matson, E. E. **Lumber grades and costs from second growth Douglas Fir timber.** *Timberman* 52 (4), 1951 (124–6).

A study was made on the milling of second-growth Douglas Fir from a 90-year-old site-III stand in Willamette National Forest. Logs ranged in length after cross-cutting from 8 to 16 ft. and in diameter from 6 to 21 in. Most, however, were 16 ft. long and 6–15 in. in diameter. Defects were few. There was practically no difference in sawing time per linear ft. for logs of different length but the same diameter, little difference in sawing time per 1,000 bd. ft. for logs from 13 to 20 in. diameter, but a marked increase in time for logs 12 in. and smaller. Overrun based on 833 logs amounted to only 15% by Scribner log rule, and the cut underran the International rule by 2%; recovery would have been higher if 1-in. timber had been cut instead of the 2 × 4 or 2 × 6 normal to this mill. The smaller logs gave better-grade timber than those over 12 in. in diameter, but the difference in quality was slight. Production costs and returns are tabulated and show a reasonable margin for stumpage, profit and risk. [Cf. *For. Abstr.* 12 (Nos. 2942, 3013).]

33.3. *Chemical Treatment*

See also *For. Abstr.* 12 (No. 3116).

33.32. Pulp and Paper Manufacture. Wallboards. Plastics

33.32.1. *Pulp Manufacture*

See also *For. Abstr.* 12 (No. 3117).

3179. ECHEVERRIA, I., and PEDRO, S. DE. ***Pinus pinaster* in Pontevedra, its normal yield and its use in the pulp industry. Part 2. Technological study of the wood of the Galician Pine in its application to the pulp industry.** *Transl. For. Prod. Res. Aust.* 1950. pp. 25 + 4 photos, 13 gphs., 1 tbl. Transl. by M. Slade from *Bol. Inst. for. Invest. Exp. Madrid* 19 (38), 1948. Part 2 [*For. Abstr.* 10 (No. 1248).]

3180. LIBBY, C. E., and O'NEIL, F. W. **The manufacture of chemigroundwood pulp from hardwoods.** New York State College of Forestry, Syracuse University, Syracuse, N.Y. 1950. pp. 42 + xii + 20 photos, 2 dgms., 28 gphs., 21 tbls. 51 refs. Price $1.00. P.R.

Detailed report of a commercial method of obtaining good mechanical pulp from hardwoods, developed at this college. Contains sections on: (1) literature survey of hardwood grinding and pre-treatment of wood for the manufacture of mechanical pulp, (2) development of the process for mechanically pulping hardwoods, (3) fundamental studies of liquor penetration into wood, (4) exploratory research, (5) development of the chemigroundwood process for hardwood mechanical pulp manufacture, (6) bleaching of chemigroundwood pulps, (7) cost analysis and (8) economic advantages of the chemigroundwood process.

3181. MCGOVERN, J. N., and MACKIN, G. E. **Farm woodlot Aspen for creped tissue paper.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1783, 1950. pp. 6 + 5 tbls. P.R.

Tests showed that it is possible to make groundwood-free tissue paper, meeting highest quality requirements, with 80–90% of pre-hydrolysed, bleached Aspen semichemical pulp and 10–20% of long-fibred softwood chemical pulp. *From authors' summary.*

3182. PADDOCK, W. R. **A forest 'weed' goes to market.** *Sth. Lumberm.* 181 (2273), 1950 (195–6).

Fire Cherry (*Prunus pennsylvanica*) was listed as an acceptable species for pulping by the Mead Corporation in the spring of 1950; other species included are Silverbell [*Halesia* sp.], Birch, Sourwood [*Oxydendrum arboreum*] and a number of other hardwoods that are associated with Cherry. The total volume of Fire Cherry in the Cherokee National Forest is estimated to be about 30,000 cords in workable stands.

3183. SITCH, D. A., and MARSHALL, H. B. **The effect of hemicellulose on the paper-making properties of White Birch.** *Canad. J. Res.* 28*F* (10), 1950 (376–89). 29 refs. P.R.

The presence of hemicellulose was found to increase the rate at which the average fibre length was reduced during beating, thus indicating a correlation between fibre flexibility and hemicellulose content. Pulps containing 10–20% hemicellulose possessed the best overall strength.

3184. JENSEN, W. Björk som råmaterial för massaframställning. 1. En diskussion av möjligheterna att använda björkfaneravfall vid sulfatprocessen. [**Birch as raw material for pulp. 1. A discussion of the possibility of using Birch veneer waste in the sulphate process.**] *Pap. ja Puu* 32 (8), 1950 (229–33). 12 refs. [Sw.sw.e.] P.R.

The amount of Birch waste produced annually in the Finnish veneer industry is estimated at about 800,000 cu.m., including bark. Results of some cooking experiments on Birch and Pine are tabulated. The Birch gives a higher output because of its greater density, shorter cooking time, and higher yield of pulp per kg. of dry wood. Less chemical is needed than for Pine in the sulphate cooking. Defibration of Birch pulp is more difficult, partly because the anatomy of Pine allows more even penetration and probably partly because of the higher concentration of lignin in the middle lamella of Birch fibres. Paper from Birch pulp is less strong than that from Pine. The cell-wall substance of the outer bark is almost completely dissolved in cooking. The white extractives of the outer bark, composed mainly of betulinol, are finely slurried and removed with the water. The greater part of the inner bark

is also dissolved, but a dark-brown undissolved residue of low mechanical strength produces small dark-brown spots in the paper. The investigations are being continued.

3185. Murto, J. O. Om flisskador. (Tillverkning av kokflis IV.) [**Defects in chips. Chipping of pulpwood IV.**] *Norsk Skogind.* 4 (11), 1950 (322–30). [Sw.e.] [Oy. Keskuslaboratorio, Helsinki.] P.R.

[Cf. *For. Abstr.* 11 (No. 3007).] Optimum lengths for chips are from 6 to 45 mm., depending on the wood species and the pulping process. Chip thickness is calculated theoretically as 15–20% of the length. For hardwoods, the quantity of fibre fragments caused by cutting the fibres during chipping is estimated to be double that of softwoods. A formula is presented for calculating the extent of crushing at one end of the chip during chipping. Graphs of the effect on paper qualities of this damage show that strength properties are decreased, and opacity is improved, when crushing is present in the chips. Chipping fines may be caused by dull knives or by the properties of the wood. Slow-grown softwoods and rot-free hardwoods give few fines, but fast-grown Spruce and Pine give as much as 6–9%. Pneumatic transport of the wood after chipping tends to increase the quantity of fines. The drier the wood, the thinner and narrower the chips tend to be.

Defects in the original wood which affect the quality are divided into 6 groups—defects of form, defects in wood structure, chemical defects, mechanical defects, fungus damage and miscellaneous defects (presence of stones, sand, nails or shell splinters, and fire damage). Unevenly dried wood gives chips of varying sizes. With frozen wood, the knives are quickly blunted and the quantity of chipping fines therefore increases. The greater part of the knot wood has been shown to come within the oversize fraction in screening; chips from wood that is severely attacked by rot come within the undersize fraction.

Programmes for research on sulphite and sulphate pulping are suggested.

3186. Holst, W. Förfaringssätt och anordning för alkalisk defibrering av träflis. [**A method for the alkaline defibration of wood chips.**] *Swedish Patent* No. 129,624, Sept. 12, 1950. [Sw.] *Abstr.* in *Svensk PappTidn.* 53 (22), 1950 (733). P.R.

The chips, for wallboards and semi-chemica pulp, are treated under pressure with gaseou NH_3 without previous vacuum treatment an are then transferred to the defibrator.

33.32.3. *Wallboards, Fibreboards, etc.*

See also *For. Abstr.* 12 (No. 3186).

3187. Pitkäniemi, T. Kuitulevyteollisuus [**The fibreboard industry.**] *Metsät. Aikak* 1950 (3/4), (101–4). [Fi.]

An account of its growth in Finland and elsc where.

3188. Elmendorf, A. **Hardboard an the method of making it.** *Brit. Patent* No 644,503, Oct. 11, 1950. pp. 4. P.R.

Method of making hardboard from finel divided wood, the fibre length being muc greater than that of sawdust.

3189. **Insulating boards from mi wastes, forest thinnings, and cull trees** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1762 1950. pp. 11. P.R.

Presents experimental laboratory data on th technical feasibility of utilizing various woo wastes ordinarily burned or otherwise dispose of at sawmills, woodworking plants, et Boards from processed sawdust, solid-woo waste, and mixtures, as well as those mad from thinnings and cull trees, fulfil or surpas more requirements than boards from un processed sawdust or from pulpmill woo waste.

3190. King, F. W., and Bender, I **Production of insulating fibreboard fron Western Red Cedar shingle mill wast** *Pulp Paper Mag. Can.* 52 (1), 1951 (75–9). refs. Also in *B.C. Lumberm.* 35 (1), 195 (36–7, 86, 88, 90, 92).

Results of tests on boards from shingle-mi waste are shown in graphs and tables. Th physical appearance and texture of all boarc were satisfactory, although the colour wa rather darker than that of ordinary commerci boards. Class-A boards weighing 17 lb./cu. f could be made from the wood component of th waste: boards weighing 20 lb./cu. ft. wer correspondingly stronger. Boards weighin 17 lb./cu. ft. from the bark component wer slightly below the modulus of rupture an

tensile strength required for Class-C boards, but boards weighing 20 lb./cu. ft. met the specifications. Boards from shingle hay (the stringy waste obtained in sawing parallel to the grain) and from sawdust were very poor and failed to meet any specifications. Wood and bark boarded in mill-waste ratio (57% wood, 43% bark) weighing 17 lb./cu. ft., practically met the specifications for Class-A boards; those weighing 20 lb./cu. ft. easily did so. At the latter density, boards including 29% shingle hay and sawdust met the Class-A requirements. Boards weighing 20 lb./cu. ft. from the complete mill waste, i.e. 53% shingle hay and sawdust, 27% wood and 20% bark, just met the requirements for Class C. A Class-C board weighing 17 lb./cu. ft. was produced from the bark and wood components with 35% shingle hay and sawdust.

3191. TURNER, H. D., and KERN, J. D. **Relation of several formation variables to properties of phenolic-resin-bonded wood-waste hardboards.** *Rep. U.S. For. Prod. Lab., Madison* No. R1786, 1950. pp. 6 + 1 photo, 1 dgm., 3 gphs., 4 tbls. P.R.

Results of a study of the effects of resin content, particle size, and moulding pressure upon specific gravity, strength, and water absorption of hardboard products made of wood waste treated with powdered phenolic resin. Modulus of rupture in bending was found to vary approximately as the cube of specific gravity, whereas water absorption varied inversely with density. *From authors' abstract.*

3192. ÖGLAND, N. J. Om limning av hårda träfiberskivor som värmebehandlas efter pressningen. **[The sizing of hardboard subjected to hot-air treatment after pressing.]** *Pap. ja Puu* 33*B* (1), 1951 (8–10). 8 refs. [Sw.e.] P.R.

The sizing agent is the resin of the wood itself, forming rosinates by ionic reaction.

3193. KOLLMANN, F., and DOSOUDIL, A. **Types of fibreboard, their properties and their testing with special consideration of the fatigue strength.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1142, 1950. pp. 59 + 49 photos, drawings, dgms., gphs. *Transl.* by M. Slade from *VDI-Forschungsheft* No. 426, 1949. [*For. Abstr.* 11 (No. 3037).] P.R.

33.34. Dyeing and Bleaching of Wood

3194. FARBER, E. (to American Walnut Manufacturers Association, Inc.). **Colouring sapwood with hydroquinone.** *U.S. Patent* No. 2,517,296, Aug. 1, 1950. *Chem. Abstr.* 44 (21), 1950 (10290). P.R.

Walnut sapwood was immersed in a 0·4% aqueous solution of hydroquinone, made acid (pH 4–6) with $NaHSO_3$, at 70° C. for 2 hours. The impregnated wood was then exposed to NH_3 vapours and dried.

33.36. Wood Finishes. Preservation of Wood. Seasoning and Drying

See also *For. Abstr.* 12 (No. 3260).

3195. CHAMBERLAIN, G. **Painting exotic timbers.** *Paint and Building Materials Report, Dominion Laboratory, Department of Scientific and Industrial Research, Wellington, N.Z.* No. 18, 1950. pp. 8. P.R.

Discusses the paintability of Douglas Fir, Yellow Pine, Corsican Pine, Radiata Pine, Larch, *Cupressus macrocarpa*, Redwood, and Western Red Cedar.

3196. MORAN, T. H. **Finishing of Douglas Fir plywood.** *Timberman* 52 (3), 1951 (55, 98, 100).

A brief account of results of exposure tests made by the Douglas Fir Plywood Association on plywood finished with paint and resin sealers.

33.36.1. *Preservation against Attack by Plants and Animals*

See also *For. Abstr.* 12 (Nos. 3056–8, 3086, 3260, 3324, 3418–20).

3197. BOULTON, E. H. B. **Notes on the control of wood-destroying fungi.** *Timb. & Plyw.* 99 (2578), 1950 (533). P.R.

3198. KINBERG, W. Ein Versuch zur Berechnung der Lebensdauer imprägnierter Hölzer aus den Grenzwerten. **[An attempt at calculating the life of impregnated timbers from the threshold values.]** *Holz, Augsburg* 4 (12), 1950 (249–51). [G.] P.R.

An empirical formula is suggested for evaluating the life, L, of impregnated timber: $L = l_1 + l_r S$, where l_r is the life of untreated

timber, l_1 the extension of life by readily soluble preservatives, and S the safety coefficient obtained by dividing the amount of sparingly soluble preservative used, by the 'effective threshold value'. Thus, round timber absorbs 63 kg./cu.m. of coal-tar oil; if the sapwood content is 60% the absorption is actually 105 kg./cu.m. of sapwood. The extraction and evaporation is *ca.* 30%. The threshold value against *Lentinus* has been found to be 24·8 kg./cu.m. The effective threshold value (minimum effective concentration) is 24·8 minus 30% = 17·36 kg./cu.m. Hence the safety coefficient is [105 – (0·3 × 105)] ÷ 17·36 = 4·23. If the life of untreated timber $l_r = 7$ years, and $l_1 = 3$ years, then the average theoretical life of treated timber, $L = 3 + (7 \times 4{\cdot}23) = 32{\cdot}6$ years.

3199. **Wood preservatives and mildewcides.** *Canadian Paint & Varnish Magazine, Toronto* 23 (8), 1949 (8, 46–7). P.R.S.

3200. BECKER, G. Neue Erkenntnisse über Fluor-Verbindungen im Holzschutz. [**New knowledge about fluorine compounds in wood preservation.**] *Angew. Chem.* 62 (16), 1950 (382–5). 13 refs. [G.] D.S.I.R.

General survey of German literature since 1940 relating to the use of F compounds in protecting wood against fungi and beetles. Their efficacy is compared with that of other preservatives. The rôle of gaseous HF is emphasized. The corroding effect of fluorides and silicofluorides on iron is described.

3201. EDÉN, J., and RENNERFELT, E. Fält- och rötkammarförsök avsedda att utröna skyddsverkan hos olika träimpregneringsmedel. [**Field and decay-chamber experiments to ascertain the protective effect of various wood preservatives.**] *Medd. Skogsforskn-Inst., Stockh.* 38 (4), 1949. pp. 35. 7 refs. [Sw.sw.e.]

Stakes and poles of *Pinus sylvestris* were used in tests begun in 1943 on the preservative effect of Tanalith U, Boliden salt, Boliden fluorine salt and coal-tar creosote. The wood was placed in 4 plots in different parts of southern Sweden, in a mine shaft and in a greenhouse. Details of preservative retentions are tabulated. Results, after 52 months, are given in graphs and tables. In the plots, untreated wood decayed badly, although the stakes, but not the poles, resisted decay in a sandy soil. Poles and stakes treated with creosote and Boliden sal showed little or no decay, with Boliden fluorin salt some, and with Tanalith U rather more Decay in the mine was slower than in the fiel treated and untreated stakes and treated pole had not been attacked, but a large proportio of the untreated poles were badly decayed. I the greenhouse, the average life of untreate stakes was 18 months, while those treated wit Tanalith U, Boliden salt and Boliden fluorin salt lasted 31, 49 and 39 months respectively The 4 stakes treated with creosote were eithe moderately or severely decayed at the end of 5 months. Decay was more rapid in leafmou than in clay soil. *Paxillus panuoides*, an occasionally *Coniophora puteana*, *Poria vapor aria* and *Trametes serialis* were isolated fron the decayed wood.

3202. KULESZA, J. **Use of arsenicals fo protection of timber.** *Przemysł Chemiczny Warsaw* 28, 1949 (424–8). [Pol.] *Brit. Abstr* BI, Aug., 1950 (753). P.R.

Reviews a number of known As compound used for impregnation of wood.

3203. LINDEN, P. J. VAN DER. Orienteren onderzoek over verdamping en uitloging va houtconserveringsmiddelen. [**Preliminar research on the evaporation and leachin of wood preservatives.**] *Rapp. Bosbouw proefsta., Bogor* No. 40, 1950. pp. 10. [Du.jav.du.e.]

Tests of evaporation from impregnate blocks and from open dishes were made o creosote and two oil residues, Ressex an Residu ('Bottum extract'). The two las though not in themselves sufficiently toxic fo use as preservatives, are often used as carrie for other preservatives. Ressex was found be very volatile, 90% of the oil evaporatin from the wood after a year, and 85% from th dishes. The figures for creosote were 41 an 25% and for Residu 8 and 4% respectively The toxicity (to *Schizophyllum commune*) c the fraction of Ressex remaining in the dish was 10 times that of the original oil, while th toxicities of the creosote and of Residu ha increased only slightly. Leaching tests we made on blocks impregnated with differe wood preservatives (2 Wolman salts, Ceasro K bichromate, creosote, Cu naphthenate, an pentachlorophenol). After 7 days, more tha half of the deposits of the water-soluble pr servatives had been leached from the block

The loss for Ceasrot (a preservative containing 42% As salt) was 98%. Leaching was much less for oil-soluble preservatives; Cu naphthenate showed a loss of only 7·2%. When timber impregnated with water-soluble salts was allowed to dry slowly (20 days' air drying) before leaching, the loss was reduced. Results are given in a graph and tables.

3204. LINDEN, P. J. VAN DER. De invloed van het vochtgehalte en de diffusie bij impregneren van nat hout. [**Moisture content and diffusion in relation to the impregnation of green wood.**] *Rapp. Bosbouwproefsta., Bogor* No. 39, 1950. pp. 16. [Du.jav.du.e.]

Stakes of *Hevea brasiliensis* and *Octomeles sumatrana* with different moisture contents were treated with various preservatives. The amount of oil absorbed was generally too small to improve the durability of the wood, although impregnation by the full-cell process gave better results than the cold-pressure method. Wolman-salt retentions under pressure were similar to those of oil. In impregnation under pressure with a dilute solution, the additional intake by diffusion of the solid salt was insignificant for air-dry wood, but considerable for green wood. The intake by diffusion in wood soaked in Wolman-salt solution was considerable for green and not unimportant for air-dry wood. The concentration of the solution had, in the latter case, less effect than was expected. Diffusion experiments with Ascu, a preservative containing $CuSO_4$, $K_2Cr_2O_7$, and $H_4As_2O_7$, showed that As diffuses more rapidly than the other components and that in using preservatives containing As it may be necessary to add As to the solution from time to time to maintain the concentration and composition of the preservative. Results of the experiments are tabulated.

3205. ROOSEN, P. De la pénétration des antiseptiques dans le bois. [**The penetration of preservatives into wood.**] *Bull. Inst. agron. Gembloux* 18 (1/2), 1950 (143–63 + 4 photos). 18 refs. [F.flem.g.e.] E.M.B.

Reviews types of preservative, methods of application and influence of wood anatomy on penetration.

3206. JACQUIOT, C. L'*Hylotrupes bajulus* L. [*H. bajulus.*] *Étude tech. Inst. nat. Bois* No. 5, 1950. pp. 6. [F.] P.R.

Describes the damage done by *H. bajulus* and methods of detection and control. Recent investigation points to the use of R.F. heating for killing larvae in roof trusses, using 0·7–2 kw, depending on the thickness of timber pieces, for periods of 30 seconds up to 5–10 minutes. For pieces that have to be taken out of the truss, kiln heating is advocated, and tables of temperature, duration and humidity (if wet heat is applied) are given for various sizes. The use of pentachlorophenol (with or without Gammexane) is recommended.

3207. PLANK, H. K. **Studies of factors influencing attack and control of the Bamboo powder-post beetle.** *Bull. fed. exp. Sta. Puerto Rico* No. 48, 1950. pp. 39. 26 refs.

[Cf. *For. Abstr.* 12 (No. 1205).]

The presence of starch in the wood, as estimated quantitatively from variations in colour intensity produced by the iodine spot test, was found to be the most important factor influencing susceptibility to *Dinoderus minutus* attack. Next in importance were the species and variety of Bamboo, the age of the culm when harvested, and the physical properties of the wood. Culms of the standard test species, *Bambusa vulgaris*, were found to contain most starch and, with few exceptions, to be the most extensively attacked. The relative susceptibility of 1-year-old culms of 11 other species, varied from 44·2% in *B. vulgaris* var. *vittata* to 0·3% in *B. textilis*. On the whole, susceptibility decreased from the base to the top of a culm. It was found that much damage could be avoided by harvesting culms of *B. vulgaris* in their 3rd year or older, *B. tulda* and *B. tuldoides* in their 2nd year or older, and *Dendrocalamus strictus* and *Sinocalamus oldhami* during their first 3 years of growth. Harvesting in August–December resulted in less infestation than harvesting in February–May. From the data obtained in these studies it does not appear that infestation can be avoided by harvesting according to the phases of the moon. Drying the felled culms at clump gave 90% control of infestation, best results being obtained in moist, hot weather when the cut culms could be kept alive for a month or more, during which period most of their starch was depleted. Shed curing for at least 8 weeks thereafter made culms even less susceptible. Infestation was reduced by 94%

by placing the freshly cut culms in water and keeping them there for 8 weeks, but this treatment stained the wood and made it light in weight and brittle.

The stepping and internodal methods of injecting water solutions of poisons into the sap stream of Bamboo culms are described. Injection of $CuSO_4$ by the stepping method gave an average of 93% control in two tests. HCl injected into the sapstream failed to hydrolyse the starch and seriously weakened the wood. Injection of growth substances (2,4-D, indolebutyric and indoleacetic acids) failed to reduce starch concentrations. Impregnation with synthetic resin made Bamboo wood immune to attack and imparted to it other desirable qualities. External applications of a number of chemicals (including pentachlorophenol and Na pentachlorophenate with S) used for *Lyctus* control, were ineffective.

DDT (5% in kerosene) brushed on freshly harvested culms, reduced internodal infestation by 94% at 2½ months after applicaton, without ill effect to the wood. DDT (5% in diesel oil fuel) applied as a 10-minute dip, reduced infestation by 98% at 3 months and 91% at 12 months after application; it was still toxic to powder-post beetles after nearly 3 years. A second dipping at 3 months is recommended where splitting occurs, and for wood in the process of manufacture, and solid or semi-solid culms. Water suspensions of DDT, preferably the micronized forms, should be used where gluing difficulties may be created by oil solutions. It is also recommended that the wettable forms of DDT be liberally sprayed or brushed on curing racks, the inside of curing sheds and workrooms, and in every place where finished articles made of bamboo may be stored. *From author's summary.*

3208. Vellozo, L. G. de Castro. As manchas do Pinho do Paraná (*Araucaria brasiliana* Rich.) laminado e o seu tratamento por agentes químicos. [**Discoloration of laminated Paraná Pine and its chemical control.**] *Arquivos de Biologia e Tecnologia, Curitiba* 3, 1948 (45–56 + 11 plates). 2 refs. [Port.e.] L.S.

Investigations were made into the nature of discolorations on laminae of *Araucaria angustifolia*, which not only spoil the appearance of the wood but prevent good gluing. They proved to be due to two fungi, *Cladosporium* sp. and *Penicillium* sp. Attack by the former is always more severe than by the latter, and the sapwood always gets more extensively infected than the heartwood. Treatment with the commercial preservatives, Dowicide A, Dowicide G, Impregna-Tox and Wolman-Tanalith salts gave complete control.

3209. [**The 'momentary dip process' for preservative treatment of veneer.**] *Rep. Qd. For. Serv. 1948–9*, 1950 (19–20 + 3 photos).

Brief description with illustrations of several types of plant. [Cf. *For. Abstr.* 10 (No. 2085).]

3210. Liese, J. Die Buchenschwelle, ihre Bedeutung für die jetzige Zeit. [**Beech-wood sleepers, their present-day significance.**] *Repr.* from *Forstw. Holzw.* 4 (13), 1950. pp. 2. [G.] P.R.

Advocates the use of Beech sleepers. Tests carried out in Germany in 1940 showed that red-heartwood-free Beech sleepers from winter-felled timber, impregnated with coal-tar oil (full-cell impregnation, 32 kg. per sleeper) were completely sound after 43 years of service. The same has been found with summer-felled sleepers after 53 years' service. In the case of red-heartwood impregnated sleepers, the degrade after 42 years amounted to 16%. Sleepers with a smaller oil content (Rüping method, 15 kg. per sleeper) showed a degrade of 4% after 28 years' service. Beech requires special care in the period between felling and impregnation, and during the impregnation process. Otherwise Beech sleepers seem to excel Pine and Oak sleepers in many respects. [Cf. *For. Abstr.* 9 (No. 1118); 12 (No. 3048).]

3211. **Preservative treatment of soft-wood timber.** *Rep. Wds. For. Dep. S. Aust. 1948–9*, 1950 (9) + 4 photos.

Inspection of *Pinus radiata* sleepers laid down in 1936 showed that, with few exceptions, creosoted sleepers of this species, if strengthened with steel fish-plates, compared very favourably with untreated Jarrah sleepers. Exceptions generally occurred on steep gradients and severe curves subject to heavy traffic, where hardwoods are mechanically superior.

Inspection of *P. radiata* telegraph poles installed in 1935–36 showed that full-length treatment by the open-tank method was fairly satisfactory, though some poles developed streaks of decay below ground level, which was

attributed to the uneven and shallow penetration of the preservatives. It is considered that an empty-cell pressure treatment would obviate this fault.

3212. GÄUMANN, E. Einige Erfahrungen mit boucherisierten Leitungsmasten. [**Some experiments with impregnated telegraph poles.**] *Schweiz. Z. Forstw.* 101 (9), 1950 (401–18). [G.f.]

Examination of a number of telegraph poles impregnated with $CuSO_4$ by the Boucherie process, and removed for replacement by the Swiss postal authorities during the period 1940–48 showed that the treatment had been generally very successful, giving an average service life of 22·5 years. In some areas, however, the average was much less, e.g. 14·4 years near Geneva, and in all cases this lowered durability was due to attack by *Polyporus vaporarius*. The author discusses the possible ways in which poles become infected, and inclines to the opinion that the primary source of infection is the tools used by workers in erecting poles, including climbing spurs. All such tools should be carefully wiped before moving on from one pole to the next. Other measures are the sterilization of the soil when poles are replaced, and tarring their butt ends. Search for a fungicidal substance additional to or as a substitute for, $CuSO_4$, and toxic to all strains of *P. vaporarius*, should be prosecuted vigorously. The possibility that resistant individuals or mutants of this fungus may occur, is put forward as an hypothesis.

3213. ANDERSON, I. V. [Compiler]. **A report on the condition of Western Larch poles in the Rock Creek-Baker, Oregon transmission line of the California Pacific Utilities Company.** Rocky Mountain Pole and Treating Association, Sand Point, Idaho. 1950. pp. 7. P.R.

3214. STERRETT, E. **Dry rot prevention in piling structures.** *World Oil, Houston, Texas* 131 (5), 1950 (180–1). M.F.P.

Review of some of the methods employed to protect timber butts in offshore structures exposed to deterioration: the following are dealt with:—capping (galvanized, copper, cast-iron), coating with heavy coal tar, periodic renewal of the creosote in the pile butt, wicking, etc.

3215. MACLEAN, J. D. **Results of experiments on the effectiveness of various preservatives in protecting wood against marine-borer attack.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1773, 1950. pp. 19 + 6 photos, 19 tbls. P.R.

The most effective among the preservatives tested were found to be the higher-boiling creosote oils and creosote fractions, the higher-boiling water-gas/tar creosotes, and solutions of coal tar in coal-tar creosote. The most effective results were obtained with heavy retentions and deep penetrations. Addition of various chemicals did not cause any important improvement. An addition of paraffin or montan wax diminished the resistance of creosote to borer attack. *Limnoria* and *Martesia* will attack treated wood that resists shipworm attack. Marine-borer attack is not confined to the portion of timber near the water surface. *From author's summary.*

3216. FAURÉ-FREMIET E., and THAUREAUX, J. Effet de quelques détergents sur l'œuf de *Teredo norvegica.* [**Effect of some detergents on the egg of *T. norvegica.***] *Biochemica et Biophysica Acta, New York & Amsterdam* 3, 1949 (536–48). 25 refs. [F.f.e.g.] O.R.S.

3217. **Application of wax treatment to berry boxes (hallocks) to control molds.** [*Publication*] *U.S. Bureau of Agricultural and Industrial Chemistry, Washington, D.C.* No. *AIC*-270, 1950. pp. 5 + 6 dgms. M.A.F.

Report (superseding *AIC*-239) of an investigation by the Western Regional Research Laboratory, Albany, Calif., to develop simple, practical equipment for the treatment of berry-picking boxes. The wax mixture used was 5% microcrystalline wax (m.p. 160–165° F.) and 95% standard paraffin wax (m.p. 143–150°). The boxes should be air-dry and free of loose sawdust, the temperature of the wax should be 15 to 20° above the melting point of the wax mixture, and the time of dip at least 15 seconds. A simple wax-dipping machine is described in detail.

33.36.2. *Fireproofing*

3218. FINCH, A. C. **Can timber be fireproofed?** *Timber News* 58 (2138), 1950 (475–6, 479). P.R.

A general account of various methods of increasing the fire resistance of timber by means of fire retardants.

33.36.3. *Seasoning. Drying*

See also *For. Abstr.* 12 (Nos. 3001, 3138–9).

3219. Thomas, A. V., and Browne, F. G. **Notes on air-seasoning of timber in Malaya.** *Malay. Forester* 13 (4), 1950 (214–23).

Notes on stacking, end splitting, sap-stain, insects, and seasoning qualities of some Malayan timbers.

3220. Findlay, W. P. K. **The resistance of wood-rotting fungi to desiccation.** *Forestry* 23 (2), 1950 (112–5). 2 refs.

The survival of wood-rotting fungi in air-dry wood has been studied by keeping samples of Pine, Spruce, and Beech, infected in the laboratory with pure cultures of *Merulius lacrymans*, *Lenzites sepiaria*, *Lenzites trabea*, *Lenticus lepideus*, and *Polystictus versicolor*, in constant humidity rooms maintained at 90, 75, 60, and 45% relative humidity for periods up to 5 years. Cultures were prepared from these samples at regular intervals. It was found that *Lenzites sepiaria*, *L. trabea*, and *Polystictus versicolor* were still alive after 5 years' storage in an atmosphere of 45% relative humidity at 25° C., i.e. in wood having a moisture content of about 10·5%. It is concluded that air-drying cannot be relied on to kill fungi in wood. *From author's summary.*

3221. Dickinson, F. E. **The seasoning properties of Determa (*Ocotea rubra* Mez.)** *Tech. Rep. Yale Sch. For.* No. 5, 1950. pp. 8 + 3 photos, 2 gphs. 4 refs.

Trials indicate that, although Determa presents certain problems in drying, it can be successfully air seasoned (6–8 months are required for 1-in. green stock), and kiln dried (mild kiln schedule, 6–7 weeks for stock having a moisture content above 90%).

3222. **Kiln seasoning [of difficult timbers.]** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (12–3).

Large kilns were used for seasoning 2-in. Rauli (*Nothofagus procera*), ½-in. Elm (*Ulmus procera*), 3-in. Western Red Cedar (*Thuja plicata*) and squares and planks up to 4½ in. thick of Oak (*Quercus robur*). The Oak squares seasoned well under the standard drying schedule, and Elm, thanks to careful piling and low temperatures, seasoned with very little distortion. The thick planks of *T. plicata* were difficult to season to a uniform moisture content, as a limited number of pieces were retentive of their moisture and tended to collapse and honeycomb when drying times were reduced within reasonable limits. The species is, therefore, classed as refractory, although much of the material dried rapidly and well.

3223. Rasmussen, E. F., and McMillen, J. M. **Seasoning of White Oak for tight cooperage.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1784, 1950. pp. 15 + 19 photos, 5 tbls. P.R.

Presents information on current practices conducive to reduction of losses due to seasoning. Application of a suitable coating on the ends of stave and heading bolts, improved air- and kiln-drying practices, and proper final-moisture-content specifications are recommended. Describes experimental results of successful kiln drying of green staves and headings for use in tight cooperage. *From authors' summary.*

3224. McMillen, J. M. **Kiln-drying of Hickory handle stock.** *Sth. Lumberm.* 181 (2273), 1950 (292, 294, 296, 298, 300, 302, 304).

Experiments were carried out at Madison to determine the seasoning conditions under which 'pinking' (a pink to reddish stain of the sapwood, caused by a chemical change in the sap) develops in Hickory (*Carya* spp.). Hickory becomes considerably pinked on drying at temperatures above 105° F. while any part of the wood is above 15% moisture content. Suggested schedules are given for small and large handle blanks. Pinking does not decrease strength but renders the Hickory unacceptable for tool handles.

3225. Czepek, E. Holztrocknung mit Temperaturen über 100° C. **[Timber drying at temperatures above 100° C.]** *Holz, Augsburg* 4 (12), 1950 (246–7). [G.] P.R.

Gives details of procedure, efficiency and energy consumption with modern high-temperature drying apparatus. The drying of 25-mm.-thick Spruce or Fir core wood for blockboards, furniture, etc., takes 75–85 KWH./cu.m. or 140–170 kg. steam at 6 atm. plus

9–10 KWH. for fans. When drying green Spruce timber (25–30 mm., initial moisture content 50%, final moisture content 12%, drying temperature 118° C., period 12 hours), the consumption is 115–135 KWH./cu.m. or 245–280 kg. steam at 6 atm.

3226. TORGESON, O. W. **A small house-furnace lumber dry kiln.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1776, 1950. pp. 12. 13 refs. P.R.

Describes a small kiln constructed and operated at Madison. It employs a simple hot-air type of house furnace for heat, fans for the recirculation of the air, through the lumber pile and furnace, and water sprays for humidification. A drawing of a proposed design is presented and described. *From author's summary.*

3227. **News and views of this kiln drying business.** *Rep. U.S. For. Prod. Lab., Madison* Nos. *D*1769–2/*D*1759–7, 1950. Each pp. 1. P.R.

A series comprising the following articles:— Have you been experiencing wood fabrication troubles in the spring when the factory switches from winter heating to opening of windows? How are kiln samples prepared for use in determining moisture content? Where should kiln samples be placed and how many should be used? What are the principal advantages in seasoning lumber? (all by *R. C. Rietz*). How can Maple and Birch sapwood be dried without sticker stain? (*J. M. McMillen*). What are the advantages and disadvantages of the package-loaded, trackless dry kiln? (*R. C. Rietz*).

3228. PERRY, T. D. **Some workable suggestions on preventing warped lumber and lumber core stock.** *Wood. Prod.* 55 (11), 1950 (29–32). 2 refs.

Suggestions include adequate kiln drying, balancing stresses by building up cores from strips, and the use of protective coatings.

3229. **Radio frequency drying.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (13–4 + 3 photos).

Tests of the 'boiling method', in which wood is heated to boiling point and the moisture extracted as steam, indicate that timbers offering little resistance to impregnation with liquids under pressure can be dried satisfactorily, but that impervious species such as Oak tend to burst as a result of the steam pressures induced. Tests were also made on the temperature-gradient method, in which a gradient from centre to surface is induced by passing cool humid air over the surface, thus reducing the surface temperature below that of the interior. Most timbers could be treated satisfactorily by this method, but, to avoid severe surface stressing and splitting, temperature differences have to be kept low and drying times comparatively long; 10 days' continuous treatment was needed to reduce 1-in. English Oak from green to an average of 12% moisture content. [Cf. *For. Abstr.* 12 (Nos. 1407, 2201).]

3230. DÉRIBÉRÉ, M. Le séchage par rayonnement infra rouge dans l'industrie du bois. **[Seasoning by infra-red radiation in the timber industry.]** *Rev. Bois Appl.* 6 (1), 1951 (24). [F.] P.R.

Quotes examples of the use of infra-red radiation for drying paint and lacquer on wooden toys, heating glue joints, and drying sawdust.

3231. **Chemical seasoning.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (13).

Tests were carried out in co-operation with the Timber Development Association at the Swindon works of the Railway Executive to determine whether degrade in kiln-seasoning thick Oak can be reduced by urea treatment. Three-inch planks of green Oak to be used for wagon building were dipped or soaked for periods from 5 seconds to 48 hours in a saturated solution of urea and then built in a pile with a number of untreated planks for kiln-drying. Both treated and untreated planks were badly split at the end of the drying period. There was no indication that the urea treatment had lessened degrade during kilning.

3232. CREIGHTON, J. W., and DEXTER, S. T. **Drying lumber by desiccating agents.** *Quart. Bull. Mich. Agric. Exp. Sta.* 33 (2), 1950 (114–23).

Desiccants have been used successfully in drying various farm crops. The method consists in impregnating porous materials such as wood or corncobs with solutions of $CaCl_2$ or a similar hygroscopic salt and then drying them. These blocks of wood or corncobs are then placed in contact with the product to be dried and left until they become decidedly moist, when they are replaced by a dry set. Of the

materials used, it was found that small blocks of wood impregnated with $CaCl_2$ were the most satisfactory and that the lighter, more porous woods took up moisture faster than denser woods.

The present report deals with experiments in using this method for drying small charges of wood. It was found practicable to do this in an air-tight chamber. The effect of the blocks is to control rather than accelerate the speed of drying, and by this control to reduce internal stresses in the wood. The method can be used by consumers of small quantities of lumber to dry it to the desired degree at a very low cost. Some preliminary experiments in the use of a curtain impregnated with a hygroscopic salt, between the air inside and that outside the drying chamber, gave promise of the possibility of eliminating the need for exchanging blocks in using this method for drying lumber.

33.37-8. Destructive Distillation. Charcoal and By-products. Use of Wood and Charcoal for Gas Manufacture

See also *For. Abstr.* 12 (No. 3120).

3233. Benić, R. Suha destilacija drveta u pokretnim postrojenjima. [**Dry distillation of wood in transportable plants.**] *Šum. List* 73 (12), 1949 (414–23). [Croat.]

Describes the construction, performance and economics of transportable plants for the destructive distillation of wood, tested since 1949 near the Jovanovic forest. Both the horizontal retort (capacity 2 cu.m.) and the vertical retort (capacity 7 cu.m.) plants have been in operation, the latter giving better results. The yield of charcoal is *ca.* 112 kg./cu.m. of (Beech) wood in either case, while the yield of pyroligneous acid is slightly higher for horizontal (187·5 kg./cu.m.) than for vertical retorts (171–180 kg./cu.m.). On the other hand, the products of vertical retorts are of better quality, as shown by the following figures (the first figures applying to horizontal and those in brackets to vertical retorts): (1) moisture content of charcoal 4·0% (3·5%); (2) ash content of charcoal (dry substance basis) 1·6% (1·7%); (3) volatile components 18·6% (17·1%); (4) fixed carbon 81·4% (89·2%); (5) fuel value of charcoal 7,200 (7,450) k.cal./kg.; (6) content of fatty acids of low molecular weight in pyroligneous acid 6·3% (6·2–7.3%); (7) alcohol content 11 (14–16) g./litre.

3234. Korobkin, V. A. **Optimum temperature for carbonization of wood.** *Stal'*, *Moskva* 8, 1948 (487–94). [Russ.] *Chem. Abstr.* 44 (3), 1950 (1246). P.R.

Air-dry Pine wood was charred for 6 and 12 hours at 250–700° C. The moisture content of the sample was determined and the yield of charcoal calculated on an oven-dry wood basis. Fixed C, volatile matter, and ash, were determined on the charcoal. The yield of fixed C was greater (at any one temperature) in 12-hour than in 6-hour charring and increased with temperature up to 400° C. and then began to decline. Charring for 12 hours with a final temperature of 400° C. yielded 28% of fixed C on a dry-wood basis. This charcoal contained 71·71% fixed C, 27·43% volatile substances, and 0·86% ash.

3235. Grondal, B. L., and Zenczak, P. **Pyrolysis of wood: recent developments.** *Trend in Engineering at the University of Washington, Seattle, Wash.* 1 (2), 1949 (23–5). 1 ref. D.S.I.R.

Describes small-scale pyrolysis experiments carried out for checking claims put forward by Slavyanskÿ [cf. *For. Abstr.* 4 (45)]. Attempts at improving the process of distilling the wood, while immersed in kerosene, under different temperatures and pressures, resulted in obtaining a high proportion of soluble tar and of acetic acid. Experiments were carried out with Douglas Fir heartwood in the form of large and small blocks and sawdust, and with Red Alder blocks. Kerosene losses were negligible. The charcoal obtained presents a very extended interior surface area.

3236. Griffioen, K. **Carbonization of some Indonesian woods in an electrical laboratory oven.** *Meded. Bosbouwproefsta., Bogor* No. 32, 1950. [pp. 17]. *Repr.* from *Tectona* 40, 1950 (241–58). [E.e.jav.]

Results of investigations on carbonization at different temperatures of 14 important species from the mountains of Java, and 8 light-weight species, are tabulated and discussed. Data given include yield, specific gravity, hardness, and ash content of charcoal; yield of distillate; and yield, specific gravity and drying capacity of the tar. Charcoal from *Schleichera oleosa*, *Eugenia cuprea*, and *Casuarina* spp. was of

excellent quality, and that from *Castanea javanica*, *Leucaena glauca*, *Acacia decurrens*, *Michelia velutina*, *Trema orientalis*, and *Albizzia falcata* was good. The species producing good yields of wood acid were *Schima noronhae*, *A. decurrens*, *E. cuprea*, *L. glauca*, *Casuarina* spp., *Ochroma lagopus* and *T. orientalis*.

3237. SARRAILLET, J. M. Carbones activos de álamo, sauce y ceibo. **[Activated carbon from *Populus nigra* var. *italica*, *Salix babylonica* and *Erythrina crista-galli*.]** *Revista de la Facultad de Ciencias Químicas, Universidad Nacional de la Plata* No. 22, 1947 (1949), (91–109). 5 refs. [Span.] L.S.

Activated carbon of good quality was obtained from sawdust of these 3 species when a mixture of $ZnCl_2$ and HCl was used as activator, 0·43 g. Zn Cl_2 + 0·13 g. HCl (dens. 1·18) being mixed with 1 g. oven-dry sawdust. Yield of carbon varied between 14 and 18·5% of the undried sawdust.

3238. KEINANEN, S. P. J. Gazogène actionné au bois ou avec un autre combustible humide. **[Gas generator run on wood or other moist fuel.]** *Norw. Patent* No. 75052, 15 May, 1949. *Abstr.* in *Chim. et Industr.* 63 (6), 1950 (636). [F.] D.S.I.R.

3239. LIVSHITS, M. L. Novÿe gazovÿ dvigatel' dlya lesosplava. **[A new producer-gas [/liquid-fuel, modified Diesel] engine for timber-floating operations.]** *Lesn. Prom.* 1950 (2), (16–7). [Russ.]

Describes, with a photograph and diagrams, a 150-h.p. engine which starts on liquid fuel and then runs on producer-gas with a minimum of liquid fuel admixed in order to ensure self-ignition under high compression and thus to retain the high compression and efficiency of Diesel-type engines. In trials, the engine worked faultlessly except that the gas generators used, running on wood fuel, did not supply enough gas, and consequently the engine had to work at 120 h.p. for much of the time. Only 3·5–3·8 kg./hr. of liquid fuel are necessary, i.e. 12–13% of the quantity required for operation entirely on liquid fuel.

33.39. Manufacture of Sugar, Oils, Alcohol, and Miscellaneous Chemical Products from Wood

3240. POPPOFF [POPOV], I. D. Beitrag zur Holzverzuckerung. **[Wood saccharification.]** *C. R. bulg. Acad. Sci.* (*Sci. math. nat.*) 2 (2/3), 1949 (45–8). 5 refs. [G.g.] D.S.I.R.

By using a solution of 40% $ZnCl_2$ in HCl (37%), the (Beech) wood cellulose was degraded to glucose. Preliminary removal of hemicellulose is claimed to reduce the lignin content by *ca.* 15% and to allow a rapid and almost complete fermentation of saccharified cellulose.

33.4. *Converted Structural Timber*

3241. JAMISON, J. V., III. **Plastic bonded plywood for cold storage doors.** *Ice and Refrigeration, Chicago* 118 (6), 1950 (72, 74). D.S.I.R.

Commercial cooler and freezer doors are now being made of marine-quality plywood construction bonded with phenolic resin. Advantages of this type of door for refrigeration purposes are greater rigidity, equal strength in both vertical and horizontal planes, one-piece construction which keeps out moisture and dirt, and ability to withstand weathering, moisture and temperature changes. *Author's summary.*

3242. **Performance tests on doors.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (20 + 1 photo).

Tentative proposals for testing new types of door include torsion and slamming tests on doors and kicking tests on panels. A torsion test based on the assumption that critical loading is most likely to occur in an attempt to force a door by pressure at mid-height against a resistance at the bottom is described; a photograph of the apparatus used is included.

3243. **Abrasion testing [of floors].** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (27).

A test of a patented end-grain flooring consisting of thin cross-sections of compressed resin-coated Birch twigs, showed it to possess extremely high resistance to wear.

3244. LAMOTTE D'INCAMPS. Constructions en bois dans l'industrie chimique. **[Wooden constructions in the chemical industry.]** *Chim. et Industr.* 64 (1), 1950 (52–6). [F.] D.S.I.R.

Advocates the use of wooden constructions in the chemical industry. The drawbacks are few, and keep diminishing in importance with

modern techniques of lamination. The advantages are: low price, low weight as compared with metal or concrete constructions of equal strength, possibility of using various methods of joining (notching, bolting, nailing, gluing), and easy dismantling and rebuilding.

33.5. *Pitprops. Sleepers. Poles and Other Roughly Converted Wood*

See also *For. Abstr.* 12 (Nos. 3048, 3210–4).

3245. COUDREAU, J. Traverses de chemins de fer en bois tropicaux. [**Railway sleepers from tropical woods.**] *Bois For. Trop.* No. 16, (1950) (369–88). [F.]

Reviews the situation in a number of tropical countries, together with the demand from Europe, and concludes that in future it is the timbers easiest to impregnate, rather than the most naturally durable, that should be used as sleepers.

3246. MAGEE, G. M. **Smoking out the true causes of tie failures.** *Railway Engineering and Maintenance, Chicago* 46 (2), 1950 (134–7). L.S.

Presents a general picture of results of studies on the causes of mechanical wear of sleepers under the plate and of checking and splitting. It has been shown that the intensity of bearing pressure is not the important factor in producing wear. Sleeper pads and special plates are discussed. To reduce the splitting and checking of sleepers a method for the seasoning and treatment of sleepers in one operation should be developed. Mutual chemical deterioration of rails and sleepers (corrosion of steel by wood acids and decomposition of cellulose structure by iron salts) is briefly noted.

3247. HOLCOMBE, R. A. **The microscopy of plate-cut railroad cross-ties.** *J. For.* 49 (1), 1951 (28–31). 4 refs.

Microscopic analysis was made of blocks cut from immediately below the fish-plates of 38 sleepers of 8 different species, immediately after their removal from the track. Crushing failure was found mostly in softwood sleepers; lateral shifting occurred only in Oak sleepers; buckling failure occurred in softwoods and diffuse-porous hardwoods.

Analysis of sleepers from curved track (usually banked) indicated a greater degree of damage at the low end of the sleeper from slow-speed curves; there was no apparent difference in the degree of damage to either end of sleepers from high-speed curves.

It appears that shear failures, lateral shifting, and crushing, are confined to those portions of wood having concentrations of large, thin-walled cells, and that denser areas of wood are strong enough to withstand the loads which cause failures in Oak springwood and the springwood areas of softwoods. Diffuse-porous woods, however, seem to contain such an advantageous distribution of thick- and thin-walled cells, that an over-all resistance to concentrated and component loads is maintained, and failure of any type is reduced to a minimum and limited to the extreme top surface.

3248. **New settings for used crossties and bridge timbers.** *Wood Pres. News* 28 (12), 1950 (149–51, 156). P.R.

Worn but undecayed sleepers and bridge timbers can be used successfully as posts for cattle corrals and loading chutes, corner or gate posts, transverse sills under the floor of corn cribs, columns for the framework and support of low sheds for pig or calf shelters. Railways themselves can use them in timber cribs or retaining walls for embankments or for bank protection along small streams; also for stock-yard posts and bumper posts.

33.6. *Packing Boxes, Crates, etc.*

See also *For. Abstr.* 12 (No. 3217).

3249. STOTHARD, F. S. **Oak spale baskets.** *J. Minist. Agric., Lond.* 57 (6), 1950 (288–90). [Rural Industries Bureau.] O.R.E.

This rural industry is now mainly concentrated in the Ulverston district of north Lancashire. Coppice Oak from the hillsides of the Lake district, together with local Hazel for the basket rims, are the raw material used by the 'swillers' or basket makers. On arrival at the swillers' yard, the Oak is sawn into required lengths, quartered, and stacked for drying. Before being riven these billets are boiled for several hours in long tanks. They are then taken hot from the boiling water and thin slats are riven or torn off by hand, the thicker slats (*ca.* $\frac{1}{8}$ in. thick) are called 'spales', while thinner slats (*ca.* $\frac{1}{16}$ in.) are called 'taws'

or 'tars'. The 'taws' are smoothed with a sharp knife, and the 'spales' with a drawknife on an intricate wooden vice, before being woven. The Hazel also is boiled before bending to the oval rim. The finished woven basket, when dried, retains its shape and rigidity under the roughest usage. A life of 1–6 years is considered quite usual. These 'swills' have a multitude of uses on the farm; many of them are used by Scottish potato growers.

33.7. *Firewood*

See also *For. Abstr.* 12 (Nos. 3119–20).

3250. LORENZI, O. DE. **Some recent developments in burning wet wood.** *Pap. Amer. Soc. mech. Engrs.* No. 49-*SA*-31, 1949. pp. 9 + 7 dgms. P.R.

Describes the recently introduced large-scale experimental installation of the single-stage furnace using both underfeed and spreader firing, giving successful operation. As a result of this development there are now available, for many types of installation, simplified combustion systems having high inherent capacity, to which automatic controls may be easily applied. *From author's abstract.*

33.8. *Other Manufactured Products*

See also *For. Abstr.* 12 (No. 3224).

3251. AREND, A. G. **Treatment of Oak for small craft constructions.** *Woodwkg. Ind.* 7 (11), 1950 (675–6). P.R.

Stresses the value of aluminium paint as an effective coating to prevent surface checking and failures in Oak wood during bending.

3252. **Softwood for batteries: the production of veneers for separators.** *Timb. Tr. J.* 195 (3876), 1950 (1038–9).

3253. **Australian standard specification for wooden separators for lead-acid accumulators.** *Aust. Stand.* No. *C.* 305, 1949. pp. 12. Price 2*s.* P.R.

3254. BLUMENSTEIN, R. **Wood and your shoes.** *Amer. Forests* 56 (12), 1950 (22–4, 43–4).

Account of the manufacture of shoe-lasts in the U.S.A., mainly from Hard Maple.

3255. MATHIEU, H. Le bois, matière première du jouet. **[Wood—the raw material for toys.]** *Rev. Bois Appl.* 5 (12), 1950 (3–6). [F.] P.R.

Discusses briefly France's wooden-toy industry.

3256. **Laminated wood to replace Persimmon.** *Woodwkg. Ind.* 8 (2), 1951 (122). P.R.

Claims that the new process produces perfect heads for golf clubs.

3257. BUTLER, C. G. **Bee-hives.** *Bull. Minist. Agric., Lond.* No. 144, 1949. pp. 2 + 20. P.R.

Account of the types and qualities of beehive at present available. Box hives are built of Western Red Cedar (or other rot-resisting material) or else of preservative-treated timber.

3258. **Beehives, frames and wax foundation.** *Brit. Stand.* No. 1300 : 1946. pp. 23. With Amendments Nos. 4 and 5, 1949. Price 5*s.* P.R.

33.9. *Grading [including Standard Specifications] and Storage of Converted Timber*

See also *For. Abstr.* 12 (Nos. 3146, 3253, 3258).

3259. WALTHER, S. Normalizacja w drzewnictwie. **[Standardization in the timber industry.]** *Sylwan* 94 (2), 1950 (76–80). [Pol.e.]

Twenty-seven Polish standards (PN/B) relating to timber had been issued up to 1950 by the Timber Section of the Polish Standardization Committee, viz. 95000 Round timber for pitprops, 95001 Pitprops, 95002 Pine pulpwood, 95003 Fir-Spruce pulpwood, 25004 Poplar pulpwood, 95006 Pine timber for standard-gauge railway track construction, 95007 Coniferous sawtimber, and the following for sawn material:—96000 Pine, 96001 Fir and Spruce, 96002 Oak, 96003 Birch, 96004 Hornbeam, 96005 Ash, 96006 Beech, 96008 Elm, 96009 Maple and Sycamore Maple, 96010 Alder; 94000 Wood wool for the building industry, 94001 Frame boards, sawn, 94002 Flooring blocks, 94003 Beech blanks, rough sawn, for bent furniture, 97000 Block-boards for cabinet-making, 97002 Plywood, 02000 Classification of sawn timber by dimensions,

02001 Tabular summary of sawn timber, 06000 Barking, and 03000 Volume tables of pitprops.

3260. **1949 Book of A.S.T.M. standards, including tentatives. (A triennial publication.) Part 4. Paint, naval stores, wood, adhesives, paper, shipping containers.** American Society for Testing Materials, Philadelphia, Pa. 1950. pp. 30 + 1289. P.R.

Contains 29 methods, definitions and specifications dealing with timber, timber products and preservatives.

3261. WISE, S. A. **Lumber grading in the U.S.A.: features of the system of standardization of qualities.** *Timb. Tr. J.* 195 (3874), 1950 (709–10).

3262. WOOD, L. W. **Southern Pine and the density rule.** *Sth. Lumberm.* 181 (2273), 1950 (236–8).

The density rule as applied to Southern Yellow Pines requires $\frac{1}{3}$ summerwood and not less than 6 rings per in., or $\frac{1}{2}$ summerwood with no restriction on rate of growth, these characteristics to be estimated by visual inspection of the ends of the piece. Pieces meeting these requirements are given a working stress for structural design $\frac{1}{6}$ higher than that for unclassified material. Bending tests at Madison show that for Shortleaf and Loblolly Pines nearly all values below 6,000 lb./sq. in. are eliminated by the density rule. In Longleaf Pine the selection is less effective, but a tendency to eliminate low-strength material is apparent. Results are shown in graphs. Figures are also given showing that the application of the density rule to working stresses excludes low values; the basic stress for clear wood from all Southern Yellow Pines without density selection is 2,200 lb./sq. in., and with density selection 2,500 lb./sq. in.

34. MINOR FOREST PRODUCTS AND THEIR UTILIZATION

See also *For. Abstr.* 12 (No. 3107).

34.2. *Vegetable Products*

3263. SHAW, E. W. **Minor forest products of the Pacific Northwest.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 59, 1949. pp. 10.

A brief account of the actual and potential use of Christmas trees, decorative branches, medicinal plants, wood products (veneer burls, Yew bow staves and rustic furniture), fruits, berries, tanbark, etc.

34.21. Fodder Grass and Grazing

See *For. Abstr.* 12 (Nos. 2645, 2647, 3568).

3264. GARRISON, G. A., and RUMMELL, R. S. **First-year effects of logging on forage production.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 62, 1950. pp. 5. 1 ref.

By the first year after logging, the amount of understorey vegetation available for grazing had been reduced at least 30% by soil denudation and slash coverage; the valuable forage grasses were the most seriously affected.

34.24. Bark Products. Tanning Materials. Cork

See also *For. Abstr.* 12 (Nos. 3081, 3313).

3265. SUCHET-D'ALBUFERA, L. Les matières tannantes végétales. [**Vegetable tanstuffs.**] *Bois For. Trop.* No. 15, 1950 (235–46). [F.e.span.]

Describes plantations of *Acacia* spp. [*A. mollissima*, *A. decurrens* and *A. dealbata*] in Morocco, Madagascar and S. Africa.

3266. HARRIS, P. C. **Notes on tanning in Argungu emirate (Jima), Nigeria.** *Fm. & For.* 10, 1950 (32–3).

In the preparatory stages, skins are steeped in cold water and wood ash of *Sclerocarya birrea*. The actual tanning is done with seeds of *Acacia arabica*.

3267. SCOTT, B. B. Estudio de las variaciones del contenido en materia curtiente de las hojas de molle (*Lithraea molleoides* (Vell) Engl.). [**Study of variations in tannin content in the leaves of *L. molleoides*.**] *Revista de la Facultad de Ciencias Químicas, Universidad Nacional de la Plata* 22, 1947 (1949), (193–204). 17 refs. [Span.] L.S.

Tannin content was estimated in leaves from trees in various parts of Argentina. Results are presented. Amounts varied from tree to tree and with season and locality.

3268. SCHURR-MICHEL, E. Ein Bostrychide, *Stephanopachys substriatus* Payk. als

Gerbrindenschädling. **[A bostrichid, *S. substriatus* Payk., as a pest of tan-bark.]** *Z. angew. Ent.* 32 (2), 1950 (285–8). 9 refs. [G.]

The beetle was found to have destroyed a large part of the contents of a silo full of tan-bark.

3269. BRYANT, L. H. **Cork from the bark of the paper-barked Tea Tree.** *Aust. J. Sci.* 12 (5), 1950 (182–3). O.B.D.

Thermal conductivity tests on shredded paper bark from *Melaleuca leucadendron*, made at the Building Research Station of C.S.I.R.O., indicate that the substance might suitably replace cork as an insulating material. Microscopic examination revealed the presence of a high % of cork cells similar to those found in the bark of Cork Oak. Tests in the manufacture of linoleum from paper-bark flour by some Sydney firms were also promising. The N.S.W. Forestry Commission is now engaged in studying barking methods, growth rates and stripping costs.

3270. NATIVIDADE, J. VIEIRA. Subericultura. **[Cork-growing.]** Ministério da Economia, Direcção Geral dos Serviços Florestais e Aquícolas, Lisboa. 1950. pp. 387 + 80 plates + 1 tbl. Numerous refs. [Port.]

A comprehensive and profusely illustrated handbook dealing with (1) the botanical characters of *Quercus suber*, (2) soil, climate and vegetation of Portugal, (3) the structure and properties of cork, (4) methods of cultivating and exploiting Cork Oak and protecting it against disease, (5) the economics of cork growing, and (6) Portuguese legislation affecting the protection of Cork Oak.

3271. **Cork substitutes.** *Brazilian Bulletin* 7 (162), 1950 (7). *Abstr.* in *Econ. Bot.* 4 (4), 1950 (336).

The cork-like bark of Pau Santo (*Kielmeyera coriacea*) from Brazil has proved to be 85–95% as good as cork, for grinding into powder to make composite substances. The cork can be stripped from 10-year-old trees, and a good grade is produced at 12 years. The tree also yields a second crop after 5 years or less. The collection of Pau Santo cork is still an unorganized industry. At present only two Brazilian cork factories use it, at an annual rate of *ca.* 4,000 tons each. It might, however, prove a valuable raw material in the U.S. cork industry. [Cf. *For. Abstr.* 10 (No. 600).]

34.25. Medicinal and Edible Plants

See also *For. Abstr.* 12 (Nos. 2688–9, 2710, 2774, 2783, 2960, 3308–12).

3272. BELSEY, S. **The Christmas tree industry in Canada.** Forestry Branch, Dept. of Resources and Development, Ottawa. 1950. pp. 6.

3273. CHEVALIER, A. Les *Strophanthus* comme plantes toxiques spécialement dans les savanes de l'Afrique Occidentale. **[*Strophanthus* species as toxic plants especially in the savannas of West Africa.]** *Rev. int. Bot. appl. Agric. trop.* 30 (337/338), 1950 (578–88). [F.] P.R.

The distribution of *S. sarmentosus* wild in the forest, and the cultivation of *S. hispidus*, are discussed, and native recipes for preparing arrow poisons from their seeds are given, with some notes on antidotes. [Cf. *For. Abstr.* 12 (Nos. 2710, 2783).]

3274. EWING, J., HUGHES, G. K., and RITCHIE, E. **The chemical constituents of Australian *Xanthoxylum* species. I. Suberosin, 6-($\gamma\gamma$-dimethylallyl)-7-methoxycoumarin.** *Aust. J. sci. Res.* 3*A* (2), 1950 (342–5). 5 refs. P.R.

Suberosin, a new coumarin, has been isolated from the bark of *Zanthoxylum suberosum* and shown to be 6-($\gamma\gamma$-dimethylallyl)-7-methoxycoumarin. *Authors' summary.*

3275. WEBB, L. J. **An Australian phytochemical survey. 1. Alkaloids and cyanogenetic compounds in Queensland plants.** *Bull. Commonw. sci. industr. Res. Organ. Aust.* No. 241, 1949. pp. 56. 5 refs.

Tabulated results of extractions of a large number of plants, shrubs and trees.

3276. ANET, F. A. L., HUGHES, G. K., and RITCHIE, E. **The alkaloids of *Pleogyne cunninghamii*.** *Aust. J. sci. Res.* 3*A* (2), 1950 (346–9). 4 refs. P.R.

The roots of *Pleogyne cunninghamii* have been shown to contain the two previously described alkaloids *l*-beburine (*l*-curine) and *d-iso*chondrodendrine. *Authors' summary.*

3277. ENGEL, B. G., and TONDEUR, R. Recherches sur les alcaloides d'*Erythrophleum*. Cassamine et erythrophlamine; fractionnement

des alcaloides totaux d'*Erythrophleum guineense*. **[Research on the alkaloids of *Erythrophleum*. Cassamine and erythrophlamine; fractionation of the alkaloids of *Erythrophleum guineense*.]** *Helvetica Chimica Acta, Basel* 32 (7), 1949 (2364–81). 20 refs. [F.f.] O.R.S.

3278. CHAKRAVARTI, K. K., DHAR, D. C., and SIDDIQUI, S. **Alkaloidal constituents of the bark of *Berberis aristata*.** *J. sci. industr. Res., India* 9*B* (7), 1950 (161–4). 3 refs. D.S.I.R.

Berberine, berberine chloride and palmatine have been isolated from the alcoholic extract of the bark of *B. aristata*. *Authors' summary.*

3279. CHATTERJEE, R., and GUHA, M. P. **Studies on *Mahonia* genus. II. Botany and chemistry of *M. acanthifolia* Don.** *J. Amer. pharm. Ass. (sci. Ed.)* 39 (10), 1950 (577–80). 10 refs. L.S.

It was shown by the isolation of the alkaloids of *M. acanthifolia* that this plant may be differentiated from *M. nepalensis* with which it is usually confused. [Cf. *For. Abstr.* 12 (No. 1481).]

3280. SCHLITTER, E., HEUSLER, K., and FRIEDRICH, W. Über die Alkaloide des Buchsbaums, *Buxus sempervirens*. I, II. **[The alkaloids of Box, *B. sempervirens*. I, II.]** *Helvetica Chimica Acta, Basel* 32 (7), 1949 (2209–40). 35 refs. [G.g.] [Organisch-chemische Anstalt der Universität Basel.] O.R.S.

3281. RAYMOND-HAMET. Les alcaloides du *Mitragyna speciosa* Korthals. **[Alkaloids of *M. speciosa*.]** *Annales pharmaceutiques françaises, Paris* 8 (6), 1950 (482–90). 6 refs. [F.] L.S.

3282. WOKES, F., and MELVILLE, R. **Apparent vitamin C in the Walnut (*Juglans regia*).** *Biochemical Journal, London* 45, 1949 (343–52). 25 refs. O.R.S.

Tables and graphs are given showing the distribution and seasonal variations of apparent vitamin C in fruits, leaves, stems, buds and catkins. Points of difference between apparent vitamin C and reductone are discussed. [Cf. *For. Abstr.* 10 (No. 1342).]

3283. DAGLISH, C. **The isolation and identification of a hydrojuglone glycoside occurring in the Walnut.** *Biochemical Journal, London* 47 (4), 1950 (452–7). 12 refs. [Ovaltine Research Laboratories, King's Langley, Herts.] O.R.S.

3284. DAGLISH, C. **The determination and occurrence of a hydrojuglone glucoside in the Walnut.** *Biochemical Journal, London* 47 (4), 1950 (458–62). 6 refs. O.R.S.

Definite seasonal variations have been found for the concentration and amount per unit of the 5-glucoside of 1:4:5-trihydroxynaphthalene in extracts from various parts of the tree (buds, male catkins, leaves and fruits). The highest concentrations were found in the winter buds and catkins and in the very young fruits weighing 0·5–1·0 g. The possible use of this substance in the economy of the plant is discussed.

3285. DAGLISH, C. **The identification of the 'apparent vitamin C' of the Walnut (*Juglans regia*) with hydrojuglone glucoside.** *Biochemical Journal, London* 47 (4), 1950 (462–6). 10 refs. O.R.S.

3286. MEYRAT, A., and REICHSTEIN, T. Evonosid, ein herzwirksames Glykosid aus den Samen des Pfaffenhütchens, *Evonymus europaea* (L.). **[Evonoside, a glucoside and cardiac stimulant from the seeds of *E. europaea*.]** *Pharmaceutica Acta Helvetiae, Zürich* 23 (4), 1948 (135–52). 32 refs. [G.] L.S.

3287. ANCHEL, M. **Identification of the antibiotic substance from *Cassia reticulata* as 4,5-dihydroxyanthraquinone-2-carboxylic acid.** *Journal of biological Chemistry, Baltimore* 177 (1), 1949 (169–77). 14 refs. H.S.B.

3288. PLANK, H. K. **Insecticidal properties of some plants growing in Puerto Rico.** *Bull. fed. exp. Sta. Puerto Rico* No. 49, 1950. pp. 17. 22 refs.

Cf. *For. Abstr.* 12 (No. 1483).

3289. PEREZ GAMBET, C. M. Valor insecticida de la *Tephrosia noctiflora* B. y de la *Tephrosia cinerea* (L.) P. **[Insecticidal value of *T. noctiflora* and *T. cinerea*.]** *Revista de la Facultad de Ciencias Químicas, Universidad Nacional de la Plata* No. 22, 1947 (1949), (259–66). 9 refs. [Span.] L.S.

Extracts from the root of *Tephrosia noctiflora* are more toxic to insects than those of seeds. Roots of *T. cinerea* have no insecticidal value.

3290. Frančišković, S. Naši tartufi. **[Our truffles.]** *Šum. List* 1950 (1/2), (23–38). 9 refs. [Croat.f.]

An account of the main species, their characteristics and distribution, in Jugoslavia, with special reference to the economically important *Tuber magnatum*. In Istria, where alone they are systematically harvested, the pre-war production amounted to some 100 quintals. The truffles develop best in association with certain trees, notably Oak, Ash, Poplar, Willow, Walnut, Beech and Fir.

3291. Silva, J. La palmera de Coateco. **[The Coateco palm.]** *Boletín de la Sociedad Botánica de México, México* No. 7, 1948 (27). [Span.] L.S.

Brief notes on *Acanthorhiza mocinni*, which produces an edible terminal bud ('coateco') and useful fibres.

34.26. Resin. Turpentine. Oils. Gums

See also *For. Abstr.* 12 (Nos. 2675, 2793, 3260).

3292. Howes, F. N. **Age-old resins of the Mediterranean region and their uses.** *Econ. Bot.* 4 (4), 1950 (307–16). 19 refs.

Describes briefly (with historical notes) the production and uses of the following: mastic (*Pistacia lentiscus* var. *chia*), sandarac (*Tetraclinis articulata*), dragon's blood (*Daemonorops* sp. and *Dracaena cinnabari*), frankincense (*Boswellia* sp.,), ladanum (*Cistus* sp.), asafoetida and galbanum (*Ferula* sp.), ammoniacum (*Dorema* sp.) and storax (*Liquidambar orientalis*).

3293. Pejoski, B. Prvi terenski rezultati dobijanja molikovog balsama. **[First local extraction of *Pinus peuce* balsam.]** *Šum. List* 74 (3/4), 1950 (126–31). 8 refs. [Croat. russ.e.]

Results of experimental work on the extraction of *Pinus peuce* balsam conducted near Bitolj (Macedonia) in 1949. The 1948 resin, when filtered in 1949, yielded 38·8% balsam and 61·2% of residual resin; the 1949 resin yielded 44·8% of balsam and 55·2% of residual resin. Residual resin contained 80·3% rosin, 12·9% turpentine oil, 5·8% residuum,and 1% water. The balsam has a density of 0·998 at 20° C., and a refractive index of 1·516. When distilled, it yields 77% rosin and 23% of turpentine oil (density 0·862, refractive index 1·462). The balsam is yellow, transparent, and has good adhesive properties. It is said to be a very good substitute for Canada balsam and Cedar oil in optical work.

3294. Čokl, M. Uporaba kemičnih sredstev pri sobodnem smolarjenju. **[Use of chemical means [of stimulation] in modern resin-tapping.]** *Gozd. Vestn.* 8 (2), 1950 (47–60). [Sloven.croat.f.]

Reviews briefly the trials made in Germany from 1933 to 1938 and U.S.S.R. instructions of 1947, for using HCl. Experiments conducted in 1949 by the Slovenian Forest Research Institute at Podbrezje showed that 25% HCl nearly doubled the resin yield from individual freshenings on Scots Pine and even with the reduced number of freshenings (done every 10 days) slightly raised the total season's yield; they did not confirm the 1948 findings of the Institute of Chemical Technology at Belgrade that the addition of $CaCl_2$ to the HCl raised the yield by a further 20% [cf. *For. Abstr.* 12 (No. 649)]. Yields from using HCl alone or HCl with $CaCl_2$ were the same. The treatments, while reddening the faces, did not harm the trees tapped; their influence on the resin itself has still to be studied.

3295. Clements, R. W. **Results of 1949 pilot-plant tests of chemical stimulation.** *Naval Stores Rev.* 60 (27), 1950 (15, 26–7). [Lake City Branch, Southeastern Forest Experiment Station.]

[Cf. *For. Abstr.* 11 (No. 3175).] Methods tested in 1949 were: (1) freshening of the lower part of the stem ('bark chipping') with acid treatment on *Pinus caribaea* and *P. palustris*, and (2) freshening of the upper part of the stem ('bark pulling') with acid treatment on *P. palustris*, both on a 2-weekly basis and with 50% H_2SO_4. These methods were compared with the regular weekly freshening without acid. On a basis of yield per freshening per 1,000 faces, treated *P. palustris* yielded 136% and 131% more resin under (1) and (2) respectively than untreated. Results with *P. caribaea* were variable but, on the same basis, treated freshenings averaged twice as much resin as the untreated. Costs of equipment and labour at

present rates are discussed with special reference to the saving effected by the 2-weekly acid-treatment method.

3296. SCHOPMEYER, C. S. **Fall vs. spring clean-up streak for acid treated timber.** *Naval Stores Rev.* 60 (35), 1950 (13). [Lake City Branch, Stheast. For. Exp. Sta.]

It has been found that resin yields from chemically stimulated freshenings are improved if the acid-killed tissue above the face is removed in the interval between tapping seasons. This can be done either in spring or autumn, but autumn is preferred, because (1) labour supervision is usually easier, (2) an autumn cut does not need to be made so high as a spring one, and (3) freshening in spring is complicated by pockets of hardened resin which accumulate under the acid-killed bark.

3297. MESSERI, A. Risultati delle resinazioni a raschietto in senso invertito sul pino d'Aleppo della foresta di Patemisco-Gallio nel periodo Maggio-Ottobre, 1949. **[The results of tapping *Pinus halepensis* by the herringbone method (using a scraper) starting high up on the tree and working downwards: [experiments] in the forest of Patemisco-Gallio, May-Oct. 1949.]** *Nuovo G. bot. ital.* (*n.s.*) 56 (4), 1949 (709–13). [It.] A.P.B.

These further experiments showed that some of the differences previously observed [cf. *For. Abstr.* 11 (No. 2175)] in cambial activity and wood formation between trees tapped in the French manner using an axe, and those tapped by the herringbone method using a scraper, were due not so much to the difference in tools as to the direction in which the face was worked (i.e. upwards in the former, and downwards in the latter method). Herringbone faces made with a scraper but worked upwards in the French manner did not produce the peculiar effects (acceleration of cambial activity and formation of several growth rings during one tapping season) that followed the use of the scraper working a herringbone face downwards. There is, however, another anatomical reaction that follows the use of the scraper and probably depends on the type of wound made by it rather than on the direction of tapping. This is a tendency to feeble lignification of the tracheids, and formation of scattered resin cells instead of the usual resin ducts, in the parenchyma.

3298. CRIVELLARI, D. Risultati di alcune modifiche apportate nella resinazione del pino d'Aleppo col sistema del raschietto. **[Results of some modifications in the tapping of *P. halepensis*, using a scraper.]** *Nuovo G. bot. ital.* (*n.s.*) 56 (4), 1949 (713–6). [It.] A.P.B.

Following Messeri's discovery [see preceding abstract] that the direction of working a herringbone face, rather than the tool employed, was responsible for certain anatomical changes in the wood of tapped trees, experiments were made to test the effect of direction of working on resin yield. The use of the scraper to form a herringbone face, starting at the base and working up the stem, gave a 33·99% higher yield than the French method (using an axe) working in the same direction, whereas earlier experiments [cf. *For. Abstr.* 11 (No. 2174)] had given a lower yield for the former method, working downwards.

3299. KISSER, J., MAZEK-FIALLA, K., and SERENTSCHY, W. Untersuchungen über den Harzgehalt geharzter Schwarz- und Weisskiefernstämme. **[Research on the resin content of tapped-out stems of *Pinus nigra* var. *austriaca* and *P. sylvestris*.]** *Mitt. öst. Ges. Holzforsch.* 2 (5), 1950 (117–20). 3 refs. [G.g.] P.R.

It has been found that careful herringbone tapping causes the resinification of only a very narrow (some mm. wide) superficial strip of the wood, while the resin content of the adjacent parts remains unaltered. On the other hand, the old method using the axe causes a strong and deep resinification of the wood below the face. *From authors' summary.* [Cf. *For. Abstr.* 11 (No. 2175).]

3300. FYFE, A. J. **Tapping of Keruing [*Dipterocarpus* spp.] for oil.** *Malay. Forester* 13 (4), 1950 (227–9).

Observations were made on 51 trees of *Dipterocarpus kerrii*, and 40 of *D. chartaceus* and *D. gracilis*, in different parts of Malaya, which had been tapped for periods varying from 7 to 20 years or more. The evidence indicates that tapping spoils the timber value to only a trivial extent. In most districts, tapping is almost confined to *D. kerrii*, and it makes up such a relatively small proportion of the total stand that even if tapping badly damaged the timber it would still not be a serious matter. In fact, any resulting damage is usually confined

to the butt log, and as the oil is an important item in village economy, especially in coastal districts where it is used for caulking boats, there appears to be no case for restriction of tapping.

3301. PENFOLD, A. R., MORRISON, F. R., MCKERN, H. H. G., and WILLIS, J. **Studies in the physiological forms of the Myrtaceae. Part III. Preliminary observations on the nature and occurrence of *Leptospermum citratum* Challinor, Cheel and Penfold, variety 'B'. Part IV. The occurrence and physiological forms in *Melaleuca bracteata* F. Muell. Part V. *Eucalyptus citriodora* Hook. and the incidence of its physiological forms.** *Researches on Essential Oils of the Australian Flora, Museum of Technology and Applied Science, Sydney* 2, 1950 (5–14). P.R.

Cf. *For. Abstr.* 12 (No. 1504).

3302. **[Variation in essential oil from different trees of *Eucalyptus citriodora*.]** *Rep. Qd. For. Serv. 1949–50*, 1950 (21).

Studies are in progress to determine the reason for the variation in oil yields and oil quality between individual trees. Analyses from successive samples of leaves from 50 trees showed a variation in yield from 0·2% to 2% between trees. The majority of the oils are of normal high-aldehyde type, but a few trees showed a low aldehyde content and oil from these trees has practically no commercial value.

3303. HARRIS, C. M., and MCKERN, H. H. G. **A note on the occurrence of guaiol in some essential oils of *Eucalyptus citriodora* Hook.** *Researches on Essential Oils of the Australian Flora, Museum of Technology and Applied Science, Sydney* 2, 1950 (15). 2 refs. P.R.

3304. NAVES, Y.-R., and ARDIZIO, P. Études sur les matières végétales volatiles CI. Sur la composition de l'essence de '*Zanthoxylum rhetsa*' D.C. **[Studies on vegetable volatile substances CI. Composition of the essential oil of *Zanthoxylum rhetsa*.]** *Bulletin de la Société Chimique de France, Paris* 1950 (7/8), (673–8). 38 refs. [F.f.] D.S.I.R.

In addition to constituents previously known, the following substances were found in the essential oil: α-terpinene, β-phellandrene, terpinene-1-ol-4, cineol-1·4, cryptone, fatty aldehydes. The presence of dimethyl ether and phloracetophenone is confirmed. *From authors' summary.*

3305. WU, C. C., and LI, L. Y. **The performance of the Tea-Oil plant, *Thea oleosa* in Kushan, Foochow.** *Fukien agric. J.* 11 (3/4), 1950 (109–18). 7 refs. [Chin.e.]

As a result of careful observations of plantations made in 1934, 8 fruit types are recognized [illustrated]. Analysis of the oil showed that oil content was correlated with fruit type and ranged from 11·24 to 39·52%.

3306. HUSSAIN, S. A., DOLLEAR, F. G., and O'CONNOR, R. T. **Oil from the kernels of Lalob fruit, *Balanites aegyptiaca*.** *Journal of the American Oil Chemists' Society, Chicago* 26 (12), 1949 (730–2). 11 refs. D.S.I.R.

The kernels contain *ca.* 46% oil. Its composition corresponds to 43·8% linolein, 30·5% olein, 23·7% saturated acid glycerides and 2·0% unsaponifiable matter. The colour of the crude oil is due almost entirely to the presence of α-carotene. *From authors' summary.*

3307. Service forestier du territoire de la Mauritanie: Rapport pour l'année 1949. **[Annual report of the forest service of Mauritania for 1949.]** *Bois For. Trop.* No. 15, 1950 (295–6). [F.]

Plots of *Acacia senegal* were tapped at different dates to determine the effect of season of tapping on yield of gum. Differences were not significant, but the yield appears to decrease slightly as the tapping is done later in the season. In general the amount of gum collected by tapping is negligible (*ca.* 1·5% of total) compared with that obtained from natural exudation. The total quantity of gum collected increases with frequency of collection; weekly collections in one stand gave a total yield 65% in excess of that from a similar stand collected monthly. Annual rainfall appears to have a marked influence on the yield of gum in the following year; rainfall was 314 mm. in 1947 and 88·6 mm. in 1948, and the gum yield in 1949 was only half that of 1948. Maximum yield is obtained from trees of 56–75 cm. diameter.

34.27. Seeds. Fruits. Leaf Fodder. Fibres and Flosses

See also *For. Abstr.* 12 (Nos. 2650, 3266, 3291, 3306).

3308. BORUSIEWICZ, A., and KAPUSCINSKI, S. **Distribution in Poland of arthropod**

pests of Juniper seeds and berries. *Prace rolniczo-leśne, Polska Akademia Umiejetności* No. 40, 1948. pp. 22. *Brit. Abstr.* BIII, Aug., 1950 (311). P.R.

Juniper berries were attacked by one or more of the following: *Eriophyes quadrisetus typicus, Diaspis visci, Chlorochroa juniperina, Megastigmus kuntzei,* and *Argyresthia praecocella.*

3309 DANFEL'D, P. Lesoplodovÿ zakaznik v yuzhnom Kirgizii. [**A forest fruit-tree reserve in southern Kirgizia.**] *Lesn. Khoz.* 1950 (2), (39–45) [Russ.]

Briefly describes the relict woodlands that occur on the S. slopes of the Chatval and Fergana Mts, in the Dzhalal-Abad and Osh districts of the Kirgiz S.S.R., valuable both as sources of fruit and nuts, and also for their rôle in soil protection and water conservation. The bulk of the wooded area, which consists mainly of 3 separate blocks of woodland, consists of Walnut stands with an admixture of Maple, Apple and *Prunus cerasifera.* These total *ca.* 40,000 ha., in addition to which there are some 4,000 ha., of Apple with Pear and *P. cerasifera,* 10,000 ha., of *Pistacia* thickets, 500 ha., of Almond, and also some Maple and Spruce mixed with fruit trees and other species. For the most part the stands are old and their health is unsatisfactory, e.g. Walnut is severely attacked by *Polyporus hispidus* and Apple by a moth [*Hyponomeuta malinella?*]. Good natural regeneration occurs from seed and coppice but is generally exterminated by grazing, competition from grass, etc. Fruit and nut yields are low owing to the poor general health of the stands, their open character, and the lack of tending. In the past much unregulated cutting and pasturing have occurred, resulting in erosion, the drying up of streams and destruction of forest in the valleys. The reserve was taken over in 1947 by the Ministry of Forest Management, and measures are being taken for its preservation. Its regeneration, improvement and extension present many problems unsolved at present. [Cf. *For. Abstr.* 8 (p. 600).]

3310. VELÁZQUEZ C., A. Cultivo y aprovechamiento de la sarrapia. [**Cultivation and exploitation of the Tonka Bean tree.**] *Agric. venez.* 15 (145), 1950 (18–21). 5 refs. [Span.] A.P.B.

A description of the most important species of *Coumarouna, C. odorata, C. punctata* and *C. oppositifolia,* their distribution and silvicultural requirements, with brief instructions on the formation of plantations, which could be of great commercial value to Venezuela.

3311. LEGRAND, D. Mirtaceas de fruto comestible (sub-familia Myrtoideae) indígenas o cultivables en el Uruguay. [**Myrtaceae with edible fruit (sub-family Myrtoideae) native to or suitable for cultivation in Uruguay.**] *AIA, Revista de la Asociación de Ingenieros Agrónomos, Montevideo* 21 (88), 1950 (20–4). 1 ref. [Span.]

Short descriptions of the relevant species.

3312. COETZEE, W. H. K., HUGO, J. F. DU T., and PRATT, F. F. **The Mexican Hawthorn—an investigation of its possibilities for the processing industry.** *Fmg. S. Afr.* 25 (296), 1950 (361–2). E.M.B.

A report on the nutritive value and palatability of fruit of *Crataegus pubescens,* now fairly widely planted in the Transvaal as a fodder tree. The fruit is a rich source of pectin (70 lb. per ton of fruit).

3313. OBASEKI, J. K. **Rope industry (minor forest produce).** *Fm. & For.* 10, 1950 (22–4).

Rope is made from the inner bark of *Erythropsis barteri,* which is obtained by felling and peeling the tree. The method of preparing the bark and making the rope is described.

34.28. Heather. Broom. Bamboos. Canes

See also *For. Abstr.* 12 (Nos. 2599, 3207).

3314. KIRBY, R. H. **Tonkin canes and rattans.** *World Crops* 3 (1), 1951 (5–7, 13). 9 refs. O.R.E.

Cultivation, preparation and marketing of *Arundinaria amabilis, Calamus* sp. and *Daemonorops* sp.

35. SALE AND DISPOSAL OF FOREST PRODUCTS. TIMBER TRADE

3315. MALLINSON, R. F. A., and GRUGEON, R. **Timber trade practice.** Cleaver-Hume Press Ltd., London. 1950. pp. 234 + 3 forms. 16 refs. Price 15*s.*

A textbook designed to instruct entrants to the timber trade in elementary principles. The following subjects are dealt with:—geographical background (36 pp.); the imported-timber trade (11 pp.); timber contracts (39 pp.); shipping and insurance (13 pp.); arbitration (8 pp.); customs and dock procedure (16 pp.); storage, handling, transport, office routine (9 pp.); inland sales, charges and costs (6 pp.); measurements, calculations, and units of sale (22 pp.); grading rules (20 pp.); the home-grown-timber trade (6 pp.); specialized branches of the trade (plywood and veneers, doors, wallboard etc.) (8 pp.); trade federations, associations and authorities (7 pp.); recent developments (new products, stress grading, laminated timber) (6 pp.).

3316. Runeberg, L. **Trade in forest products between Finland and the United States of America.** *Acta for. fenn.* 54 (1), 1949. pp. 166. 205 refs. [E.e.fi.]

38. CONSTRUCTIONAL WORKS. ENGINEERING

38.2. *Building Construction. Foundations and Superstructures*

3317. Stern, E. G. **Improved nails. Their driving resistance, withdrawal resistance, and lateral load-carrying capacity.** *Repr.* from *Trans. Amer. Soc. mech. Engrs.* 72 (8), 1950 (987–98). 11 refs. P.R.

Results are presented, in the form of graphs and tables, of tests performed on (2–4 in.) plain-shank, spirally grooved ('Screwtie') and annularly grooved ('Stronghold') nails in Southern Yellow Pine, White Oak, and Beech. Data are given of the effect on nail properties of: nail type, size, point, shank pilot, steel composition, heat treatment, cement coating; wood species, wood density, and annual rings. *From author's synopsis.* [Cf. *For. Abstr.* 11 (No. 3131); 12 (No. 1429).]

3318. Perry, T. D. **Research in nails.** *Sth. Lumberm.* 181 (2273), 1950 (203–6).

Cf. *For. Abstr.* 12 (No. 1429).

3319. **A new technique for demountable timber-structures.** *Wood* 16 (1), 1951 (26–8).

Describes with illustrations a new system of timber construction evolved in France, using standard timber lengths and a simple fixing device (Aplex Demountable U-bolt) consisting of a U-bolt with holding plates.

3320. **Structural investigations.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (18–20 + 4 photos).

Methods and results of tests on economical roof designs are described [cf. *For. Abstr.* 11 (Nos. 3220–1)]. Preliminary results of tests on suspended floors suggest that thinner boards than are generally used may be satisfactory.

3321. **Timber roof trusses for domestic buildings.** *Aust. Timb. J.* 16 (7), 1950 (498–9, 501).

Nailed and riveted truss roofs designed by the Commonwealth Experimental Building Station at Sydney need far less timber and can be erected more quickly than traditional rafter roofs. Bolts and split-ring connectors are not suitable for use with Australian hardwoods, which tend to split during shrinkage unless a small fixing unit is used. The riveted truss has relatively few rivets but needs thin galvanized-iron gusset plates. The nailed truss needs more timber and a large number of nails—256 nails as against 90 rivets for a 28-ft. truss. The average thickness of members in a riveted truss is $1\frac{5}{8}$ in. and in the nailed truss $3\frac{1}{2}$ in. Diagrams are given showing the layout and variations from the rectangular plan.

3222. Kalt, M. *et al.* Développer la construction en bois est un devoir pour les pays forestiers tropicaux. **[Development of timber construction is a duty for tropical countries with forest resources.]** *Bois For. Trop.* No. 16, 1950 (389–99). [F.]

Report of a group of French architects who toured the French Cameroons in order to investigate the durability etc. of dwelling houses of timber construction. Buildings of 40 years and upward, found still in good condition, were all raised on piles set in blocks of good masonry and surrounded by spacious verandahs. In addition to being the most durable, this is also the most comfortable and well ventilated type of house. Possibilities of some degree of prefabrication of nailed members are discussed.

3323. Sallenave, P. Une solution au problème de l'habitation en bois pour les pays

tropicaux. **[A solution of the problem of wooden houses for tropical countries.]** *Bois For. Trop.* No. 15, 1950 (267–86). [F.e.span.]

Outlines a scheme for erecting a standard, termite- and rot-proof dwelling, with plans, drawings and detailed instructions. [Cf. *For. Abstr.* 12 (No. 665).]

3324. **Dry rot in buildings.** *Rep. For. Prod. Res. Bd., Lond. 1948*, 1950 (31).

Superficial sterilization of brick walls does not always prevent *Merulius lacrymans* from growing out again if dampness persists. Renderings of ordinary Portland cement were readily penetrated by the fungal strands and after a short time softened and fell to powder, presumably as a result of the acids produced by the vigorous fungus growth in the wood. Zinc oxychloride renderings, however, were not penetrated. Tests on the effect of X-rays on *M. lacrymans* showed that the fungus was unaffected by even heavy doses.

3325. VERRALL, A. F. **Decay of wood siding is preventable.** *Sth. Lumberm.* 182 (2274), 1951 (55–7).

Recommendations include the use of unstained timber and of building designs that restrict water entry and allow rapid drying of wood wetted by rain seepage.

3326. SILVERSIDES, C. R. **Building papers in logging camp construction.** *Woodl. Sect. Index Pulp Pap. Res. Inst. Can.* No. 1123 (*B*–3), 1950. pp. 5.

Recommendations are made for choosing papers for their efficiency as a weather barrier, strength, weathering quality and cost, and notes are given on methods of application.

38.3. *Road and Bridge Construction*

See also *For. Abstr.* 12 (Nos. 3091, 3537).

3327. STAMM, E. P. **Logging road construction.** *Timberman* 52 (2), 1950 (64–5, 68, 70, 72, 74, 76, 78).

3328. GROB, H. Waldweg- und Strassenbau in den schwedischen Staatswäldern. **[The construction of forest roads and highways in the Swedish state forests.]** *Schweiz. Z. Forstw.* 101 (7/8), 1950 (376–80). [G.f.]

3329. HAUDENSCHILD, W. Die Verwendung von Baumaschinen im Waldstrassenbau. **[The use of mechanical tools in making forest roads.]** *Schweiz. Z. Forstw.* 101 (10/11), 1950 (531–45). 9 refs. [G.f.]

Describes the construction, by the commune of Monthey, of 3·9 km. of forest road at a cost of 28–30 Swiss fr./m., using the following equipment:—(1) Mechanical shovel, (2) dragline excavator, (3) Muir-Hill motor tipper, (4) drills (for use on rock), (5) two types of stone-breaker, (6) roller. The machines and their proper uses are described in some detail.

3330. NÄGELI, G. Einfluss von Wegbreite, Hangneigung und Böschungswinkel auf die Baukosten eines Waldweges. **[The influence of width of road, gradient, and slope of embankments on the cost of making a forest road.]** *Schweiz. Z. Forstw.* 101 (7/8), 1950 (359–75). [G.f.]

3331. WIBSTAD, K. Snøpakket traktorvei. **[Compacted-snow tractor roads.]** *Norsk Skogind.* 5 (1), 1951 (18–9). [Nor.] P.R.

Experience with these roads in northern Sweden is discussed. The compacting is done with a crawler tractor, the only maintenance necessary being the use of a road drag immediately after compacting, and at other times when the road surface needs levelling. Compacting is best done at temperatures below – 8° C. At 0° C. the snow is apt to clog the tracks of the tractor. The road should be made 50% broader than a normal tractor road and when finished will be a well compacted belt of snow or ice 40–50 cm. below the level of the surrounding snow. A road 4–4·5 m. broad and 9·4 km. long on the border between Västerbotten and Lapland cost some 690 Swedish *Kr.* and took 34½ tractor hours. In 2 months, 2,900 cu.m. of timber were carried, and costs of loading, unloading and carriage amounted to 4·60 *Kr.*/cu.m. Loading was done with a light loader mounted on skis; unloading by hand.

3332. **Modern timber-concrete bridges.** *B.C. Lumberm.* 34 (11), 1950 (39–40, 100).

3333. MASANI, N. J. **Simple calculations in the design of forest bridges of**

stock spans of 15, 20, 30 and 40 feet. V (a) and (b). Graphical method. *Indian For.* 77 (1; 3), 1951 (28–54; 192–205).
Cf. *For. Abstr.* 12 (No. 2285).

3334. KNAPO, A. Statický výpočet svršku lesníckych drevených mostov podl'a najnovších dispozícií. [**Static calculations for wooden bridges in forests; latest specifications.**] *Pol'ana* 6 (9/10), [1950] (205–10). 5 refs. [Slovak.]

38.6. *Drainage*

See also *For. Abstr.* 12 (No. 2764).

3335. LUKKALA, O. J. Soiden turvekerroksen painuminen ojituksen vaikutuksesta. [**The settling of peat as a result of drainage.**] *Commun. Inst. for. Fenn.* 37 (1), 1949. pp. 67. 26 refs. [Fi.g.]

It was found that the sides of drainage ditches in peat soils sank from 25 to 80 cm. in the first 5 years according to the type of soil.

4. FOREST INJURIES AND PROTECTION

41. TECHNIQUE OF FOREST PROTECTION

3336. Howard, F. L., and Horsfall, J. G. **Concepts in plant chemotherapy.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 2. X.

Discusses methods of using chemotherapeutants to prevent protoplast necrosis and wilt in plants caused by toxins.

3337. Potts, S. F., Garman, P., Friend, R. B., and Spencer, R. A. **Construction and operation of ground equipment for applying concentrated sprays.** *Circ. Conn. agric. Exp. Sta.* No. 178, 1950. pp. 35.

42. INJURIES FROM INORGANIC AGENCIES, EXCLUDING FIRE

See also *For. Abstr.* 12 (No. 3472).

42.1. *Air Currents*

See also *For. Abstr.* 12 (Nos. 3343–4).

3338. Rivals, P. Effets des cyclones sur les arbres à la Réunion. [**Cyclone damage to trees on Réunion.**] *Trav. Lab. for. Toulouse* 5 (1) Art. 1, [1950?]. pp. 8. [F.]

Records observations on the resistance of a number of exotic species to the cyclones of 1944–45, in which velocities of as much as 200 km./hr. were attained in gusts. The most resistant species were *Araucaria cookii, Cinnamomum camphora, Cryptomeria japonica, Platanus acerifolia* and *Tabebuia pallida.* The last-named species and *Calophyllum inophyllum* have the advantage of being very resistant to salt spray, as well as being wind-fast.

42.2. *Temperature Influences*

See also *For. Abstr.* 12 (Nos. 3068, 3500).

3339. Münch, E. Forstliche Frostschäden im Winter 1939/40. Ergebnisse einer Umfrage der Gesellschaft Reichsarboretum. [**Frost damage to forests in the winter of 1939/40. Results of an enquiry by the National Arboretum Society.**] *Forstwiss. Cbl.* 67 (1), 1948 (10–7). [G.]

3340. Lamprecht, H. Über den Einfluss von Umweltsfaktoren auf die Frostrissbildung bei Stiel- und Traubeneiche im nordostschweizerischen Mittelland. [**The influence of environmental factors on frost-crack of Pedunculate and Sessile Oak in the north-east of the Swiss plateau.**] *Mitt. schweiz. Anst. forstl. Versuchsw.* 26 (2), 1950 (360–418). 53 refs. [G.g.f.]

[Cf. *For. Abstr.* 12 (No. 2720).] The following facts were established as a result of this study:—Frequency of frost-crack increases with d.b.h. It varies greatly with site. The % of *Q. sessiliflora* affected was less in the *Querceto-Carpinetum luzuletosum* than in the *Q.-C. aretosum,* and was highest in the *Querceto-Betuletum; Q. robur* was least affected in the transition areas between *Q.-C. luzuletosum* and *Q.-C. aretosum,* and highest in the relatively damp sites. Other things being equal, frost-cracks occurred more often on slopes than on the level, and frequency increased with gradient. Co-dominants were more susceptible than dominants. Incidence was significantly greater for standards over coppice than for high forest.

An overwhelming majority (94·9%) of frost-cracks were found to begin at 0–1 m., and end between 0 and 2 m. above ground level. On the level, frost-crack was found on all aspects; on slopes it occurred more often on the down-hill side, a tendency that increased with the steepness of the slope. For any given gradient the large trees had more cracks on the down-hill side than the trees of medium diameter.

There was a direct correlation between mean length of cracks and frequency. On the whole they were shorter on the Pedunculate than on the Sessile Oak. A number of trees were found with 2 or more cracks.

Recommendations in accordance with these data are made for choice of site and species, and silvicultural treatment, of Oaks in this area.

42.3. *Precipitations*

See also *For. Abstr.* 12 (Nos. 2690, 2938).

3341. Marsden, D. H. **Dry weather and tree troubles in Massachusetts.** *Plant Dis. Reptr.* 34 (12), 1950 (400–1). A.P.B.

An analysis of precipitation in 1929–38 and 1939–49 shows that its amount during the growing season (May–September) for the decade 1939–49 was 30·28 in. less than in the previous decade. This probably accounts for the increase of diseases, due to lack of soil moisture.

3342. B., A. Chablis de neige. **[Snow breakage.]** *Bull. Soc. for. Belg.* 58 (2), 1951 (33–7). [F.]

The heavy snowfalls of December, 1950, coinciding with absence of wind and relatively high temperatures, resulted in much snow breakage in Belgian forests, especially in stands of Douglas Fir at high altitudes. Damage usually affected groups of trees, and observation showed that it was usually the insecurely rooted Douglas Fir which fell first, bringing others down in its fall. A large proportion of the fallen Douglas Fir had asymmetrical crown development, and all these had fallen in the direction of their greatest crown development.

42.5. *Chemical Influences. Nutrient Deficiencies*

See also *For. Abstr.* 12 (Nos. 2628, 2824).

3343. Day, W. R. **The soil conditions which determine wind-throw in forests.** *Forestry* 23 (2), 1950 (90–5). 3 refs.

The effect of soil conditions on root development and anchorage against wind-throw in Britain is examined briefly, with reference to recent original observations in that country and work by others in central Europe. The crux is held to be the gripping of an adequate inert mass of soil by the roots. The importance of drainage is brought out, and the danger when exceptional weather makes the critical layers of a soil semi-liquid and unstable. No root disease need be associated with overturning in such conditions. On the other hand, Beech on shallow soil over chalk may be wind-thrown through starvation and death of roots running down 5 or 6 ft. into the fissured chalk rock. The physics of ditch draining require study, and so does the ability of various tree species to maintain natural drainage. Where there is special danger of wind-throw it is held that thinning practice should favour deep crowns rather than shallow, and silviculture should favour an irregular rather than an even canopy. Particular types of soil and vegetation in Britain where the danger of wind-throw is high are mentioned, with special reference to Spruce (*Picea* spp.). *From author's summary.*

3344. [Day, W. R.] **Root disease of conifers with special reference to the dying of Sitka Spruce and its liability to wind-throw.** *Rep. imp. For. Inst. Oxf. 1949–50*, 1951 (12–3).

Field investigation of small areas of diseased Sitka Spruce in the Forest of Dean confirmed previous observations that (*a*) an extensive dying-back of the root system takes place before there is any obvious sign of disease in the crown; (*b*) an undue decrease in the rate of height growth is usually the first sign that the root has become diseased; thinning of the crown and loss of foliage follow later, and by then the root disease is already far advanced; (*c*) none of the known root parasites occur on the affected root systems. The trees grow on a freely draining loam, *ca.* 24 in. deep, overlying a compact, hard, but not impermeable, subsoil which is largely impenetrable to roots. The indications are that the soil supply within this limited rooting space becomes inadequate when the trees reach a height of 40–50 ft., and that the dying of the root and the generally diseased condition of the trees are caused by this. These results were confirmed by study of Sitka Spruce in Kyloe Woods, Northumberland. [Cf. *For. Abstr.* 11 (No. 3360); 12 (No. 1540).]

3345. Day, W. R. **Forest hygiene. II. The imperfection of the environment and its importance in the management of forests.** *Emp. For. Rev.* 29 (4), 1950 (307–15). 21 refs.

Discusses the environmental factors in the development of disease, illustrated by data on the influence of soil profiles on the growth of Sitka Spruce. [Cf. *For. Abstr.* 12 (No. 2290).]

3346. Heiberg, S. O., and White, D. P. **Potassium deficiency of reforested Pine and Spruce stands in northern New York.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 2. X.

Starvation of young coniferous plantations on sandy soils (former old fields) was successfully relieved by soil mulches of fresh branches from *Pinus strobus*, *P. resinosa* and *Acer saccharum*, and also by humus from old *P. strobus*/*Tsuga canadensis* stands. *P. resinosa* plots treated in

May 1943 and in May 1946 with various chemical fertilizers responded excellently to applications of 200 lb. KCl per acre. Good results were also obtianed with 200 lb. K_2SO_4 per acre and logging slash from Pine stands. Similarly deficient coniferous plantations responded equally well to K fertilizing. Chemical analyses of needles collected in autumn showed a strong correlation between growth response and a high K content in the tissue. Pines with deficiency symptoms never contained more than 0·34% K (oven-dry weight) in the current needle tissue, whereas healthy or fertilized Pines contained 0·45–0·74%. Annual height growth in fertilized trees was 46–104% greater than that of controls and the effect of the 1943 treatment continued into 1949.

3347. GOURLAY, W. B. **Town trees and telephone wires.** *J. R. hort. Soc.* 76 (2), 1951 (64–5). O.B.D.

Purple-leaved Plum (*Prunus cerasifera* var. *atropurpurea*) growing along a roadside in Cambridge showed definite signs of injury from drip from telephone wires. Other ornamental trees, such as Almond, Thorn and Japanese Cherry, were scarcely, if at all, affected. The author suggests that, in rainy weather, telephone wires may shed weak Cu salts injurious to some species.

43. FOREST FIRES

See also *For. Abstr.* 12 (No. 2645, 2765).

3348. **Forest fire protection abstracts.** Forestry Branch, Department of Resources & Development, Ottawa. 1 (1), 1950. pp. 17.

The purpose of this publication is to summarize all items of current interest in the field of forest fire control and classify them according to subject matter. The items have been chosen with particular reference to their applicability in Canada. It is proposed to issue further numbers from time to time, in loose-leaf form, which may be inserted in the binding cover supplied with the first number.

3349. AHOLA, V. K. Poimintoja metsähallinnon metsäpalotilastosta. **[Selections from the State Forest Department's Statistics on forest fires.]** *Metsät. Aikak.* 1950 (5), (157–8, 161). [Fi.e.]

A commentary on the forest fire statistics compiled by the Forestry Board for the years 1924–49 shows July to be the peak danger month. The war years 1940–42 had the most extensive fires, totalling 36 of over 1,000 ha. each, but most of these were due to dry thunderstorms. A special table classifies the main causes of fires in the State forests of N. Finland between 1924 and 1949, lightning being the chief and careless fire lighting the second cause. Statistics have been kept in Finland since 1865.

43.0 *Predisposing Factors and Causes*

3350. **Special fire hazards: forest fires.** *Rep. Fire Res. Bd., Lond. 1948*, 1950 (26, 28 + 1 plate).

Two sample plots, each 1 chain sq., were selected in Forestry Commission plantations [age and species not stated] of a type presenting the highest fire hazard. In the first plot an experimental fire was started to windward at a point source. Fire developed very slowly and took about ½ hour to reach the opposite side of the plot. In the second plot, an attempt was made to simulate conditions prevailing, for instance, when fire enters a plantation from an area of heathland outside. This was done by priming the whole windward edge of the plot with *Molinia* and *Calluna* and igniting at 4 points simultaneously. The fire developed very rapidly and covered half the plot in about 2 minutes. At the height of its progress the fire advanced at about 16 ft./min., and in 7 minutes it had destroyed most of the plot. Wind speed during the experiment was *ca.* 6 m.p.h.

3351. **[A forest fire caused by a Diesel locomotive.]** *Rep. N.Y. St. Conserv. Dep. 1949*, 1950 (68).

The operation of railways in New York State in 1949 caused 5% of the fires reported to forest rangers and fire wardens in that year. It was definitely established that one fire was caused by a Diesel locomotive—the first authenticated case recorded in the State. Some grades of detergent lubricating oils used in Diesel-type locomotives are apt to loosen the carbon deposits in the exhaust manifold. When full throttle is used, these carbon deposits are forced out of the exhaust openings, and can cause fires along the permanent way.

43.1. *Protective Measures (including controlled burning)*

See also *For. Abstr* 12 (Nos. 2858–60, 3514).

3352. WESTCOTT, J. C., and CLEARY, V. P. **An account of the use of the helicopter in fire suppression work in the Victorian mountain forests.** *Aust. For.* 14 (1), 1950 (11–6 + 1 photo).

During March 1950, tests were made of a Sikorsky S-51 helicopter [cf. *For. Abstr.* 8 (No. 2702)] for assistance in fire detection and suppression in mountainous country in Victoria. It was demonstrated that the helicopter is capable of operating successfully in such country, the machine being able to land and take off at altitudes up to 5,500 ft. Wind is the meteorological factor most likely to limit operations, the helicopter being highly unstable in very turbulent air. Other limitations are the somewhat small payload, rather restricted range, and small centre of gravity. The greatest value of the helicopter appears to lie in establishing rapid contact with outbreaks of fire, particularly in places difficult of access by ground crews.

3353. PRASAD, J. **Controlled burning in Chir (*Pinus longifolia*).** *Indian For.* 75 (2), 1949 (1950), (26–38).

Annual controlled burning is now regarded as an indispensable measure for the protection of *P. longifolia* forests from fire. In order to determine the loss in increment due to this annual burn, an experiment was started in 1936 in a young plantation at New Forest, Dehra Dun. Data obtained during the first 5 years of this experiment indicated that there was no significant loss of increment in respect of either diameter or height in the burnt area compared with that of the unburnt. Data are also given on the effects of burning on the ground flora.

3354. WEAVER, H. **Fire as an ecological factor in the southwestern Ponderosa Pine forests.** *J. For.* 49 (2), 1951 (93–8) 12 refs.

[Cf. *For. Abstr.* 10 (No. 1748).] Discusses, *inter alia*, the use of growth rings and fire scars for elucidating the past history of a stand in relation to fire.

3355. DAVIS, W. S. **Nebraska firebreaks.** *Fire Control Notes* 12 (1), 1951 (40–3).

The 20,000-acre Nebraska National Forest was all planted on grass-covered sand dunes subject to intense grass fires. The plantations are protected by a system of permanent firebreaks. The exterior firebreaks, designed to protect the forest from invasion by prairie fires, consist of 3 ploughed-and-disked 20-ft. strips of sand separated by strips of grass at least 150 ft. wide. The sand strips are disked annually to prevent vegetation from creeping in, and one or other of the grass strips is burnt each year; two seasons' growth of grass is required for a clean burn. The interior firebreaks, which divide the plantations into units of less than 1 sq. mile, are single lanes of grass edged by disked strips. The grass is burned off every second year. Since the establishment of the firebreak system in 1910, plantation losses by fire have been small although there have been many large 'outside' fires.

3356. DUGELAY, A. Du contre-feu. **[The counter-fire.]** *Rev. for. franç.* 3 (1), 1951 (31–7). [F.]

Discusses the legal responsibility for employing counter or back fires in forest fire fighting, the dangers inherent in the method, and the safeguards to be employed.

43.3. *Fire Damage*

See also *For. Abstr* 12 (No. 2858–9).

3357. DAHMS, W. G. **How long do Ponderosa Pine snags stand?** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 57, 1949. pp. 3. 2 refs.

Ten years after a fire on a 15-acre plot, a little over half the dead standing trees were down, and after 22 years, 78% had fallen. The rate of falling, shown in a graph, suggests that a few are likely to stand for many years. The smaller trees tend to fall before the larger, but this is not invariable.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

3358. SIMMONDS, N. W. **Notes on the biology of the Araceae of Trinidad.** *J. Ecol.* 38 (2), 1950 (277–91). 7 refs.

The Araceae of Trinidad are found throughout the island, and very few plant communities lack one or more members. They include epiphytes and climbers. Growth rates of the most active climbers average some 60 cm. per year. Sometimes they pervade the whole forest from the ground to the canopy. The

forest species are shade-tolerant; other species have high light demands and grow along streams, at forest borders, in openings, or on well illuminated, widely spaced cultivated trees. Notes are given on the more important species.

44.1. *Forest Weeds*

See also *For. Abstr.* 12 (Nos. 2630–2, 2877–8, 2944–5, 3527).

3359. DAHMS, W. G. **The effect of Manzanita [*Arctostaphylos* sp.] and Snowbrush [*Ceanothus velutinus*] competition on Ponderosa Pine reproduction.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 65, 1950. pp. 3.

Observations showed that the brush did not significantly affect the early establishment of Pine seedlings but that it sharply reduced the growth of established seedlings. Manzanita is much more severe in its effect on seedlings than Snowbrush.

3360. BARNARD, R. C. **Eradication of *resam* (*Gleichenia linearis* Burn).** *Malay. Forester* 13 (4), 1950 (229–30).

Experiment showed that if *resam* is cut once, completely, and close to the ground, it is killed. In the experiment, no recolonization by *resam* seedlings had occurred up to 26 months after cutting. [Cf. *For. Abstr.* 11 (No. 641).]

3361. KING, L. J., LAMBRECH, J. A., and FINN, T. P. **Herbicidal properties of sodium 2,4-dichlorophenoxyethyl sulfate.** *Contr. Boyce Thompson Inst.* 16 (4), 1950 (191–208). 24 refs.

This chemical has been distributed to a number of investigators as Experimental Herbicide 1 by Carbide & Carbon Chemicals Division, Union Carbide & Carbon Corporation, 30 East 42nd St., New York 17. In tests with a large number of compounds, this was found to be relatively non-toxic when applied directly in aqueous solutions of low concentration to the foliage of plants or to germinating seedlings, but to be highly herbicidal when used in combination with soil. Sterilization experiments showed that its effectiveness is largely the result of biotic action. Lack of injury to foliage from spray or dust applications is in marked contrast to such applications of 2,4-D. Studies of the rate of disappearance of the new herbicide in soil, under greenhouse conditions, indicated that the time required is 12–30 days when 1–10 lb./acre is applied. Best weed control was obtained when the herbicide was applied several days after germination of weed seeds had begun. Good control of broad-leaved weeds was obtained with an application of 2–3 lb./acre on the day of planting or 4 or 7 days later. Best control of crab grass (*Digitaria* spp.) was obtained when application was made 4 days after planting.

3362. YOUNG, V. A., FISHER, C. E., DARROW, R. A., MCGULLY, W. G., and YOUNG, D. W. **Recent developments in the chemical control of brush on Texas ranges.** *Bull. Tex. agric. Exp. Sta.* No. 721, 1950. pp. 18.

Brief notes on the results of 2,4-D, 2,4,5-T, Ammate, arsenical, petroleum and other sprays on a number of brush species.

3363. STOECKELER, J. H., and HEINSELMAN, M. L. **The use of herbicides for the control of Alder brush and other swamp shrubs in the Lake States.** *J. For.* 48 (12), 1950 (870–4). 5 refs.

A series of 46 $\frac{1}{20}$-acre plots were laid out in an Alder [*Alnus incana*] swamp near Hiles, Wis. The Alder was 8–12 ft. high and very dense, with 6,000–11,000 larger stems and 4,000–6,000 smaller (2–3 ft.) sprouts per acre. There was a sparse understorey of Ash and Balsam Fir 1–8 ft. high. Spraying the foliage with esters of 2,4-D killed enough of the Alder to stimulate the growth of the young Balsam Fir, the cost of treatment being $5.78–$6.98 per acre. Almost complete elimination of Alder was obtained by cutting, and swabbing the freshly cut stumps with an Ammate solution, at a cost, including cutting, of $24.81/acre. Almost equally good results were obtained with Esteron 245 as a foliage spray, at a cost of $12.68/acre.

The only adverse effect of treatments on the valuable tree species were noted on plots where Ammate was deliberate sprayed on their foliage, causing it to brown in 5–10% of the trees. Weedone was ineffective and actually increased the number of Alder sprouts.

3364. TORREY, J. G., and THIMANN, K. V. **Application of herbicides to cut stumps of a woody tropical weed.** *Bot. Gaz.* 111 (2), 1949 (184–92). 17 refs. *Publication, Atkins Garden and Research Laboratory of Harvard*

University, Soledad, Cienfuegos, Cuba (Journal Series) No. 8. O.B.D.

The use of 2,4-D as a spray to control *Dichrostachys nutans* has already been investigated [cf. *For. Abstr.* 10 (Nos. 1403–4)]. The present study was made to ascertain the effect of applications of the herbicide to cut stumps, on regeneration from the long horizontal roots of the plant. Other experiments were designed to throw some light on the entry and translocation of the herbicide and the reaction of the plant to it. The following results were obtained:—Several herbicides were tested by painting on to cut stumps. The most effective was a 20% aqueous solution of the butyl ester of 2,4-D applied twice. Higher or lower concentrations of this emulsion, the butyl ester of 2,4,5-T, and concentrated sodium-arsenite solutions were all less effective. The addition of gas oil to the 2,4-D ester greatly retarded the latter's effectiveness, and there was evidence of inhibition of its transport in the stump. Extraction and bio-assay of the 2,4-D in portions of stump-treated or sprayed plants showed no evidence of its entry into the roots, within 2½ weeks, though it was detected in stems of root suckers of the same plants. Removal of the tops of the plants causes a decrease in starch content of the roots, but over a period of several weeks the starch content may rise again, possibly as a result of contributions from other plants on the same root system. Defoliation by treatment with 2,4-D also brings about great reduction in starch content, but unhindered development of leafy shoots increases it. It is suggested therefore that repeated defoliation may be necessary for killing the underground parts of the plant. It appears to be essential to treat all plants in one area at the same time so as to leave no source for replenishment of carbohydrates in the plants. Topping and 2,4-D treatment also help to reduce starch storage in the roots.

3365. Wyman, D. **Killing woody plants with chemicals.** *Arnoldia, Harvard University, Mass.* 10 (10/11), 1950 (61–71). L.S.

A summary of experimental results at the Arnold Arboretum. The cheapest material for eradicating most kinds of brush is Dow's Brush Killer (a 50/50 mixture of the isopropyl esters of 2,4-D and 2,4,5-T) applied before the end of the growing season or about mid-June. Du Pont's Ammate and Dow's TCA (the Na salt of trichloroacetic acid) are also effective against brush, poison-ivy and witch grass, but cost more, and the latter is slightly dangerous to the operator.

3366. Loustalot, A. J., Muzik, T. J., and Cruzado, H. J. **Movement of TCA and 2,4-D in soil.** *Rep. fed. exp. Sta. Puerto Rico* 1950 (21).

In a field experiment made to study the movement of TCA (Na trichloroacetate) in soil, it was found that when no rainfall followed application of the herbicide, TCA moved only into the surface inch of soil. When the equivalent of ¼ in. of rainfall was applied, the TCA moved down to about 5 in. below the surface, and with 1 in. of rainfall to at least 8 in. below, though enough remained in the first 2 in. to inhibit germination and growth of corn. In a similar experiment 2,4-D did not move beyond the surface inch of soil, and very little moved beyond the first ½ in. This may be accounted for by a chemical reaction in which the soluble Na in 2,4-D is changed to the insoluble Ca salt or/ and by adsorption by the soil particles.

3367. Loustalot, A. J., and Delgado, R. F. **Persistence of sodium trichloroacetate.** *Rep. fed. exp. Sta. Puerto Rico* 1950 (21).

Reports on experiments to determine the effect of temperature, soil moisture and soil texture on the persistence and movement in the soil of this promising new herbicide.

44.2. *Parasitic (Higher) Plants*

3368. Gäumann, E., and Péter-Contesse, J. Neuere Erfahrungen über die Mistel. [**New light on Mistletoe.**] *Schweiz. Z. Forstw.* 102 (2/3), 1951 (108–19). 6 refs. [G.f.]

Reviews two recent studies (by Plagnat on the altitudinal distribution of Mistletoe on Fir in France [cf. *For. Abstr.* 12 (No. 2332)], and Paine on the susceptibility of Pear trees to penetration and toxic damage by Mistletoe). Paine has shown that the hypertrophy of tissues of the host in the neighbourhood of points of attack, increases with a repeated infection, as also does the necrosis of attacked tissues. It seems, therefore, that repeated infestations with Mistletoe may in some cases increase the sensitivity of a host to the point of intolerance. The present authors suggest that the altitudinal limits to Mistletoe established by Plagnat, may

be explained by such hypersensibility of the hosts, fostered by the unfavourable growing conditions, and reaching the point of complete intolerance. It is also suggested that the slower rate of increment of infested trees, though in part directly due to the infestation, may be due in part also to their generally greater age.

3369. **Parasitic plants.** *Rep. For. Dep. Trin. Tob. 1949*, 1950 (8).

Mistletoe is one of the major pests on forest trees and in the old plantations in Trinidad. An investigation of the species involved showed that there were 8 of *Phoradendron*, 2 of *Loranthus*, and one each of *Phthirusa* and *Struthanthus*. A survey of alternative hosts is being made.

44.3. *Fungi and Bacteria*

See also *For. Abstr.* 12 (Nos. 2680–1, 2687, 2691, 2766, 2941, 2958, 3336–7).

3370. HARTLEY, C. **The Division of Forest Pathology.** *Suppl.* to *Plant Dis. Reptr.* No. 195, 1950 (445–62). 166 refs. A.P.B.

A summary of research work (with bibliography) carried out by the Division since its creation.

3371. PINTO-LOPES, J. **Wood-rotting polypores of standing trees in Portugal.** *Bol. Soc. broteriana* (*Sér.* 2) 23, 1949 (219–23). [E.]

3372. BOYCE, J. S. **Development of tree diseases in the United States.** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 2. X.

In the younger stands of the eastern U.S.A., where conditions begin to resemble those of Europe, pathological problems similar to European ones are beginning to arise. Previously harmless fungi now become increasingly dangerous to trees outside their natural range, on unsuitable sites or in stands of unnatural composition, e.g. *Fomes annosus* on *Pinus strobus* and *Picea rubens*.

3373. SCHOBER, R., and ZYCHA, H. Beobachtungen über Stockfäule in nordwestdeutschen Lärchenbeständen. **[Butt rot in Larch stands in northwest Germany.]** *Forstwiss. Cbl.* 67 (2), 1948 (119–28). 3 refs. [G.g.]

[Cf. *For. Abstr.* 12 (No. 2504).] The occurrence of butt rot increases with age, from 80 years onwards, and is not dependent upon site, for the rot is found in a wide variety of soil and climatic conditions, though on the whole more commonly in quality classes I and II. In 75% of cases the rot was due to *Trametes radiciperda* [*Fomes annosus*]; for the rest *Polyporus schweinitzii* was largely responsible. Rot was most often found in the biggest and most valuable trees, so that in areas where it is likely to arise, a felling age of 120–140 years should not be exceeded.

3374. FRIEDRICH, A. G. Untersuchungsergebnisse zum 'Alten und Neuen' über die Sitkafichte (*Picea sitchensis* Carr.). **[Results of past and present researches on Sitka Spruce.]** *Forst u. Holz* 6 (3), 1951 (37–8). 10 refs. [G.]

The susceptibility of *P. sitchensis* to attack by *Fomes annosus* and (subsequently) *Dendroctonus micans*, makes it inadvisable to plant it in mixture with other species also subject to *F. annosus* attack. In coastal areas with high rainfall, *P. sitchensis* gives good results when planted on windy and water-logged sites. Mixed stands on such sites should be well tended and a careful watch kept for *F. annosus*.

3375. RAVE. Zu den Untersuchungsergebnissen über die Sitka des Herrn Dr. Friedrich. **[Results of Dr. Friedrich's researches on Sitka Spruce.]** *Forst u. Holz* 6 (3), 1951 (38–9). [G.]

The author holds that the high yields obtained from *Picea sitchensis* in Germany outweigh the dangers of loss from *Fomes annosus* attack.

3376. [DAY, W. R.] **The fungus flora of live Spruce stems.** *Rep. imp. For. Inst. Oxf. 1949–50*, 1951 (13–4).

[For an earlier report on this subject, see *For. Abstr.* 11 (No. 3281).] Isolations made from drought-cracked trees showed that their wood is always colonized by fungi, some of which are hymenomycetes known to cause decay of timber. Most, so far, have proved to be either ascomycetes or *Fungi imperfecti*. Heartwood of trees that had not suffered from drought-crack or other known injury, but which grew among drought-cracked trees, was also examined for the presence of fungi. A test carried out in Radnor Forest, in 4 plots of

Sitka Spruce of different seed origin, showed that fungi were probably present in the heartwood of all the trees, although the distribution of mycelium was much less extensive than in drought-cracked trees. Similar results were obtained elsewhere. It would appear that infection of this type, which occurs before any large side branches have developed, become injured mechanically, or died, must take place through the suppressed side branches on the lower part of the stem or through their stubs after brashing. It is suggested that the extent of development of the mycelia that enter in this way depends largely on the condition of the tree and is less in healthy, vigorous trees and those that are dying and drying out, than in any that are merely in a low state of vigour.

3377. [Day, W. R.] **[The colonization of Larch cankers, and bark lesions in Beech, by fungi.]** *Rep. imp. For. Inst., Oxf. 1949–50*, 1951 (14).

Investigation of Larch cankers [cf. *For. Abstr.* 10 (No. 1412)] indicates that freshly dying or dead tissue in which the colour change that occurs upon death is not yet complete, is sterile. Infection with fungi, and to some extent with bacteria, takes place fairly rapidly, especially when the extension of a canker is taking place and fungus mycelium exists in the neighbouring dead tissue. Much of this mycelium belongs to species of fungi other than *Dasyscypha wilkommii*, the Larch canker fungus. These results support the now generally accepted conclusion that frost is the important killing factor in canker development.

Similar investigations were made of the necrotic patches that occur on the bark of the main stem of Beeches. The dominant fungus in the wood below the dead bark is eventually *Polyporus adustus*, which rots the wood and causes the so-called 'snap-Beech' disease. The indications are that, often at least, freshly dead bark is sterile; abundant bacterial infection may occur quite early, and mycelium of a number of species of fungus (including a *Nectria*) ultimately develops abundantly on the necrotic areas, where, it is suggested, the colonization of Beech bark follows a course similar to that of Larch bark.

3378. Zycha, H. Die Rindenfäule der Buche (*Fagus sylvatica*). **[Bark disease of Beech.]** *Abstracts of Papers, 7th International Botanical Congress, Stockholm.* 1950. pp. 1. [G.] X.

Discusses the relationship between insect attack, fungus infection, climatic influences and Beech bark disease.

3379. Roth, E. R. **Cankers and decay of Oak associated with *Irpex mollis*.** *Plant Dis. Reptr.* 34 (11), 1950 (347–8). 2 refs. A.P.B.

A description of the cankers and associated decay.

3380. Fergus, C. L. ***Strumella* canker on Bur Oak in Pennsylvania.** *Phytopathology* 41 (1), 1950 (101–3). 3 refs. (*Contribution, Department of Botany, Pennsylvania Agricultural Experiment Station* No. 159.)

Describes an occurrence of *Strumella coryneoidea* on *Quercus macrocarpa*, the first report of the pathogen on this species. Out of 260 trees in the stand, which grew on a poor site, 30 were killed and 100 others cankered.

3381. Wester, H. V., Davidson, R. W., and Fowler, M. E. **Cankers of Linden and Redbud.** *Plant Dis. Reptr.* 34 (8), 1950 (219–23). 4 refs. A.P.B.

In a survey of cankers on *Tilia* spp. in the National Capital Parks, 4 types of canker were found. Inoculation studies showed that *Botryosphaeria ribis* and *Diplodia theobromae* isolates from the most important canker (Type 1) on *T. neglecta* caused canker of *T. neglecta* and other *Tilia* species. The cankers induced by inoculation did not resemble the Type 1 cankers, but this may be due to the method of inoculation whereby the cambium was exposed to immediate infection. *B. ribis* isolated from cankers on *Cercis canadensis* produced cankers readily when inoculated on to *T. neglecta*, and *vice versa*. It is possible that all 4 types of canker are caused by one or more strains of *B. ribis*, and that the different types of canker noted in the field are due to differences in host response. Susceptibility to the canker varied widely in different species. Most resistant were *T. platyphyllos*, *T. europaea* and *T. dasystyla*.

3382. Diller, J. D., and Davidson, R. W. ***Cucurbitaria elongata* associated with a canker of Honeylocust in Ohio.** *Plant Dis. Reptr.* 34 (8), 1950 (224). A.P.B.

The canker was observed on *Gleditsia triacanthos* in only one locality and was characterized by a sloughing-off of killed crown branches. Inoculation experiments with the fungus have so far been unsuccessful.

3383. **Chestnut blight caused by the fungus *Endothia parasitica*.** *Bookl. For. Comm., Lond.* No. 3, 1950. pp. 2 + 4 coloured plates.

3384. GÄUMANN, E. Über das Kastaniensterben im Tessin. **[The dying of Chestnut [due to *Endothia parasitica*] in the Ticino.]** *Schweiz. Z. Forstw.* 102 (1), 1951 (1–20 + 6 plates). 9 refs. [G.f.]

E. parasitica, first observed in the Ticino in 1948, is spreading rapidly. It has not yet been determined whether this is identical with the American strain, or how virulent it is.

3385. GRAVES, A. H. **Relative blight resistance in species and hybrids of *Castanea*.** *Phytopathology* 40 (12), 1950 (1125–31). 8 refs. [Connecticut Agricultural Experiment Station and U.S. Division of Forest Pathology.]

Presents an evaluation of resistance to *Endothia parasitica* of various species of *Castanea* and of a number of hybrids, the evaluations being based on inoculation experiments and observations over a period of 30 years.

3386. BRETZ, T. W., and LONG, W. G. **Oak wilt fungus isolated from Chinese Chestnut.** *Plant Dis. Reptr.* 34 (10), 1950 (291). A.P.B.

Chalara quercina, the fungus causing Oak wilt, was isolated from 5 *Castanea mollissima* trees growing in a district of Missouri where Oak wilt was present. It caused defoliation, top drying and, in some cases, sapwood discoloration of the Chestnuts.

3387. RIKER, A. J. **The spread of Oak wilt in local areas.** *Abstr.* in *Phytopathology* 41 (1), 1951 (30).

Spread of *Chalara quercina* was followed and mapped in 41 plots in Wisconsin during 1939–49. Radial spread from the infection area followed roughly the same pattern in all plots, and usually involved 1–2 trees per season. *Quercus macrocarpa* and *Q. alba* growing among *Q. borealis*, *Q. velutina* and *Q. marilandica*, often escaped infection and were usually the only Oaks remaining alive in a wilt area.

3388. BECKMAN, C. H., and KUNTZ, J. E. **Translocation of poisons, dyes, and radioiodine, and its relation to Oak wilt.** *Abstr.* in *Phytopathology* 41 (1), 1951 (2–3).

Local spread of Oak wilt through natural root grafts [cf. *For. Abstr.* 11 (No. 3293)] was studied by tracing similar tree-to-tree movements of Na_2HAsO_3, Ammate, and radioactive iodine^{131}. In a plot of *Quercus marilandica*, 5 trees were killed when one tree was treated with Na_2HAsO_3. Radioactive iodine^{131} moved within 6 hr. to 3 trees respectively 2, 5 and 12 ft. from the nearest treated tree. Grafts from *Q. macrocarpa* to *Q. macrocarpa* and from *Q. alba* to *Q. alba* were few. In 31 plots of mixed *Q. macrocarpa* and *Q. marilandica* only one case of movement and one graft were found between these species. Lateral translocation from local treatments occurred extensively within individual *Q. marilandica* but was limited within individual *Q. macrocarpa* and *Q. alba*. Upward movement of radioactive iodine^{131} was as rapid as 12 ft. within 15 min. in *Q. marilandica* and *Q. macrocarpa*. Downward movement was limited except where root grafts occurred.

3389. KUNTZ, J. E., and RIKER, A. J. **Oak wilt in Wisconsin.** *Wis. Conserv. Bull.* 15 (6), 1950 (20–3). B.A.P.

Extensive root grafting among Oaks is thought to be one of the causes of spread of Oak wilt (*Chalara quercina*), symptoms of which are described [cf. *For. Abstr.* 11 (No. 3293)]. In some areas rate of spread has been reduced by removing all dead and dying trees, and all newly wilted ones as they appear. Individual trees in lawns and parks can be protected by severing root connexions.

3390. KUNTZ, J. E., and RIKER, A. J. **Control of Oak wilt in certain local areas.** *Abstr.* in *Phytopathology* 41 (1), 1951 (23).

A further report on control of *Chalara quercina* in Wisconsin [cf. *For. Abstr.* 11 (No. 3293)]. In 10 plots, trenching between wilting and healthy trees has prevented further spread for 2 years. The Wisconsin Conservation Department has developed a tractor-drawn knife which moves 100 ft. per min. and cuts roots to a depth of 36 in.

3391. Bretz, T. W., and Henry, B. W. **Oak wilt in Arkansas.** *Sth. For. Note Sth. For. Exp. Sta.* 70, 1950 (1).

Infection has appeared in a few trees in different districts in the north.

3392. Frederick, L., and Howard, F. L. **Comparative physiology and pathogenicity of eight isolates of *Ceratostomella ulmi*.** *Abstr.* in *Phytopathology* 41 (1), 1951 (12–3).

3393. Caroselli, N. E., and Feldman, A. W. **Dutch Elm disease in young Elm seedlings.** *Phytopathology* 41 (1), 1951 (46–51). 10 refs.

Attempts have been made to find a method of obtaining successful inoculations of 1- to 2-year-old Elm seedlings with *Ceratostomella ulmi*. A high incidence of disease occurred when seedlings in full leaf were kept in the dark for 5 days before inoculation, and then left in daylight. Two conditions seem necessary to produce a high degree of wilt: (1) a physiological change in the host resulting from a reduction of the carbohydrate or metabolite reserve, and (2), a light factor. It also seems necessary for these two conditions to be established in this order.

3394. Feldman, A. W., and Caroselli, N. E. **Soil and tree acidity in relation to susceptibility to Dutch Elm disease.** *Abstr.* in *Phytopathology* 41 (1), 1951 (12).

A method of measuring the pH of the outer xylem tissue of Elms was evolved. The alkalinity of greenhouse-grown, potted Elm seedlings increased from pH 5·5 to 7·2–7·4 after the soil was limed. Within 7 days the pH of roots and stems reached 6·9 and 7·2 respectively and then sank rapidly below the values for seedlings in unlimed soil. No wilt developed when limed trees were inoculated, whereas unlimed trees wilted within 21 days of inoculation. A reinoculation of seedlings 25 days after liming, however, gave 40% mortality. Field experiments, though incomplete, show similar trends. Seedling Elms exposed to a 5-day dark treatment before inoculation showed increased susceptibility [cf. preceding abstract], but this is not due to a change in pH. Delay of wilt symptoms for 3–4 weeks owing to host absorption of OH-ions supports laboratory data in suggesting that the *Ceratostomella ulmi* toxin complex is inactivated at and above pH 7·0.

3395. Caroselli, N. E., and Feldman, A. W. **Dutch Elm disease chemotherapy with Carolate and related formulations.** *Abstr.* in *Phytopathology* 41 (1), 1951 (6).

Carolate (low-magnesium lime salicylate and urea) was tested for its efficacy in reducing injury from Dutch Elm disease. When Elms were inoculated with *Ceratostomella ulmi* after application of Carolate by hydraulic soil impregnation, the disease was arrested in *ca.* 70% of the trees for more than 2 years. The tree responds to Carolate by forming a broad annual ring enclosing the discoloured tissue. Carolate is not fungicidal in itself, and severe trunk wounding of trees inoculated 2 or 3 years previously, causes a fresh outbreak of the disease. Records from 1,100 trees treated with Carolate show a mortality of 40% when less than 5% wilt was present at the time of treatment, and 79% mortality when more than 5% wilt was present.

3396. **[A disease of *Pinus radiata*.]** *Rep. For. Dep. Nyasald. 1949*, 1950 (7).

Die-back of leading shoots and side branches of *P. radiata* in the Limbe plantations has now been shown to be due to a species of *Diplodia*. So far, mortality has been small, but growth has been severely checked. It has been decided not to use *P. radiata* as a principal species in afforestation until more is known of the incidence of this disease. *P. patula* and other fast growing exotic Pines seem not to be affected.

3397. Cummins, G. B., and Ling, L. **An index of the plant rusts recorded for Continental China and Manchuria.** *Suppl.* to *Plant Dis. Reptr.* No. 196, 1950 (520–56). 93 refs. A.P.B.

3398. Pohjakallio, O., and Vaartaja, O. Über Vorkommen und Sporenbildung von *Coleosporium melampyri* Kleb. auf verschiedenen Standorten und Wirtspflanzen. **[The occurrence and spore formation of *C. melampyri* on different sites and host plants.]** *Acta for. fenn.* 55 (2), 1948. pp. 15. 16 refs. [G.fi.]

The conclusions reached from a study of this rust fungus were as follows:—Spore formation on Scots Pine was most abundant on sites where *Melampyrum* was most plentiful. There was no indication that the degree of infestation was influenced by the amount of light in the stand.

Injury to the Pine was only slight, whereas the affected plants of *Melampyrum* often withered away prematurely, especially in the most strongly illuminated stands. Site quality appeared to have no influence on incidence. *M. sylvaticum* subsp. *tenuifolium* was more susceptible to the rust than was *M. pratense* subsp. *vulgatum.*

3399. Castellani, E., and Graniti, A. Su un *Verticillium* parassita del *Cronartium asclepiadeum.* [**A species of *Verticillium* parasitic on *C. asclepiadeum.***] *Nuovo G. bot. ital.* (*n.s.*) 56 (4), 1949 (628–38). 12 refs. [It.it.e.] A.P.B.

It was observed that many aecia of *Cronartium asclepiadeum* on branches of *Pinus nigra* were covered by a snow-white, felt-like mycelium of a *Verticillium* which girdled and entered the aecioconidia. This was identified as *V. coccorum.* Experiments with artificial inoculation showed that it could also parasitize the uredoconidia of some other rusts. *V. coccorum* is probably identical with *V. hemileiae*, parasitic on *Hemileia vastatrix.*

3400. Hahn, G. G., and Miller, A. **Rust immunity of Canadian black currants under field conditions in Connecticut.** *Plant Dis. Reptr.* 33 (6), 1949 (275–6). 2 refs. A.P.B.

3401. Hahn, G. G. **Further evidence that immune *Ribes* do not indicate physiologic races of *Cronartium ribicola* in North America.** *Plant Dis. Reptr.* 33 (7), 1949 (291–2). 5 refs. A.P.B.

Field observations and tests with two Canadian black currant hybrids, 'Crusader' and 'Coronet', have shown them to be immune to *C. ribicola*, and afford further support, of a negative kind, to the theory that only one race of the fungus exists in North America. [Cf. *For. Abstr.* 10 (No. 2941).]

3402. Mackay, J. H. E. ***Uromycladium tepperianum* (Sacc.) McAlp. on *Acacia decurrens* Willd. [in Canberra].** *Aust. Plant Dis. Recdr.* 2 (4), 1950 (53). I.M.I.

3403. Zobrist, L. Zehn Jahre Versuche zur Bekämpfung des schwarzen Schneeschimmels *Herpotrichia nigra* Hartig. [**Ten years' research on the [chemical] control of brown felt-blight of conifers, *H. nigra.***] *Schweiz. Z. Forstw.* 101 (12), 1950 (632–42 + 7 photos). 5 refs. [G.g.f.]

Cf. *For. Abstr.* 11 (No. 2263).

3404. Boyce, J. S., Jr. ***Lophodermium pinastri* and needle browning of Southern Pines.** *J. For.* 49 (1), 1951 (20–4). 19 refs.

On the basis of field observations and pathogenicity tests, it is concluded that *L. pinastri* is probably not pathogenic to Pines in the south-east of the U.S.A., but readily invades needles attacked or weakened by other causes.

3405. Vermillion, M. T. **A needle blight of Pine.** *Lloydia* 13 (3), 1950 (196–7). P.R.

Provisional description of a disease of *Pinus strobus* seedlings, characterized by a considerable browning and killing of needles. The disease seems to be the White Pine needle blight caused by a species of *Pestalozzia*, probably *P. funerea.*

3406. Fergus, C. L. **An epiphytotic of White Oak anthracnose in central Pennsylvania.** *Plant Dis. Reptr.* 34 (10), 1950 (292–4). 4 refs. A.P.B.

Weather conditions and infection of *Quercus alba* by *Gnomonia veneta* in the campus of Pennsylvania State College were studied over a period of 7 years, with a view to finding some relationship. In both 1944 and 1950, years of severe infection, a winter with temperatures higher than normal was followed by a cold and delayed spring with moderate precipitation.

3407. Florenzano, G. Una specie di *Valsa*, nuova per l'Italia. [**A species of *Valsa*, new in Italy.**] *Nuovo G. bot. ital.* (*n.s.*) 56 (4), 1949 (661–6). 5 refs. [It.] A.P.B.

Detailed account of appearance and life cycle of a fungus found on diseased Poplars near Pisa and identified as *Valsa sordida* Nitschke.

3408. Thirumalachar, M. J., and Pavgi, M. S. **Sooty stripe disease of Bamboo in India.** *Bull. Torrey bot. Cl.* 77 (5), 1950 (385–8). 4 refs. O.B.D.

The cause of this disease of *Bambusa* in India proves to be a fungus, *Papularia arundinis* (also reported on culms of *Arundo donax* and *A. mauritiana* in Europe, North Africa and North America), which gains entry to the host through wounds.

3409. BIRCHFIELD, W., and WEBER, G. F. **Control of *Rhizoctonia* damping-off of *Pinus caribaea* seedlings.** *Abstr.* in *Phytopathology* 41 (1), 1951 (4).

Presents the results of tests with various commercial treatments of soil and seed against *R. caribaea.*

3410. CAMPBELL, W. A. **The occurrence of *Phytophthora cinnamomi* in the soil under Pine stands in the Southeast.** *Abstr.* in *Phytopathology* 41 (1), 1951 (5–6).

The abundance of the fungus was determined in 61 plots in Pine stands outside the littleleaf area in Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Texas. Isolations were obtained from soil of 48% of the 61 plots, regardless of the type of stand, and from 52% of 50 plots in stands containing Shortleaf or Loblolly Pine, either pure or in mixtures. *P. cinnamomi* was present in the soil in only 14% of 7 plots in stands containing Slash and Longleaf Pine. In only 26% of the 30 plots from which the fungus was isolated was it recovered from 6 or more of the 24 samples taken. In general, although the fungus was isolated from the soil under Pine stands outside the littleleaf area, it was present in relatively fewer plots, and in relatively smaller amounts than in the soil of plots in the littleleaf area of the South Carolina Piedmont.

3411. FRASELLE, J. V. **Experimental evidence of the pathogenicity of *Fusarium oxysporum* Schl. f. to the Oil Palm (*Elaeis guineensis* J.).** *Nature, Lond.* 167 (4246), 1951 (447). 3 refs.

45. DAMAGE BY ANIMALS

45.1. *Mammals*

See also *For. Abstr.* 12 (Nos. 2911, 2938–9).

3412. GRANT, W. **Control of deer damage in Germany.** *Quart. J. For.* 45 (1), 1951 (45–7 + 3 photos).

An effective and cheap method of protecting the leading shoots of young trees from being browsed by deer has recently been devised in Germany, whereby each tree can be protected individually. The substance used is a solution sold under the trade name of 'Herbasan', and it is claimed by the manufacturers that it contains neither acid, oil, nor tar, all of which are injurious to young growing plants; a purely vegetable thinning solution is used. The equipment used for applying it consists of a container holding about a gallon, carried on the back. A small tap at the base enables the flow to be turned on or off. Attached to the tap is a 3-ft. length of ½-in. rubber hose, the other end of which is connected to a wooden device rather like a large pair of pliers, to the end of each arm of which is fixed a detachable brush 2½ in. square. The rubber hose fits on to a rigid metal tube which runs the length of one wooden arm and terminates in an outlet in the middle of the brush. The brushes are adjustable up and down the arms of the 'pliers' to suit the height of the operator. The solution passes through the tube into the head of the brush and the flow can be regulated by a fly nut. Hand pressure closes the pliers and a simple spring device opens them when pressure is released. This action, bringing the brushes into contact, keeps them constantly impregnated with the solution. The operator walks up a line of plants, grips each leading shoot between the brushes, and drawing them up, leaves the shoot smeared with the protecting fluid. With very little practice, the operation can be carried out at a walking pace, and a great deal of ground can be covered in a day. This method has been found to be 100% effective in preventing damage to leading shoots, and the solution applied in November is effective until the following spring, when the new growth presents a further portion of vulnerable shoot. It has been established that deer bite only from above and not from the side, so that treatment has to be repeated annually for 4–5 years until the trees are out of danger. The operation is normally carried out by women and boys, and trials have shown that one operator can treat *ca.* 7 acres planted at a spacing of 4 × 3 ft. in a normal 8½-hr. day. At present rates of exchange, the complete equipment costs £3. 5*s.* with spare brushes available at 5*s.* 6*d.* each. The solution costs 12*s.*/gal. and about one pint does an acre. It is suggested that this treatment should be tried against rabbits.

Deer damage by barking usually occurs to trees of outstanding growth in plantations 5–10 years old. Deer have a great dislike for metal of any kind, and as soon as any damage is noted, metal rings, *ca.* 4 in. in diameter, are hung on one of the side branches of the

damaged tree *ca.* 2 ft. 6 in. from the ground. Once the deer come into contact with the metal, when rubbing, they leave the tree strictly alone. The rings, made at negligible cost from discarded tin cans, achieve excellent results.

3413. **Raising of plantation of *Bombax malabaricum*.** *Rep. For. Dep. C.P. & Berar 1947–8*, 1950 (13–7).

Data are given from a number of attempts, none of them very successful, to establish stands of *B. malabaricum*, chiefly by direct sowing. It is concluded that this is a difficult species to establish in this region (Central Provinces), the adverse factors being:—(*a*) the long dry season, on account of which seedlings die back year after year; (*b*) the liability of the soft young shoots and succulent taproot to damage by deer, pigs, porcupines, hares etc. Strong fencing is essential, and irrigation in early life can probably reduce die-back, but both are very expensive.

3414. Turček, F. K ekologii veverice—*Sciurus vulgaris fuscoater* Alt. **[The ecology of the squirrel—*S. vulgaris fuscoater*.]** *Pol'ana* 6 (9/10), [1950] (197–201 + 11 photos). 15 refs. [Slovak.]

Squirrel damage noted by the author in Slovak forests is on an extensive scale. He lists 23 conifer and 18 hardwood species of importance as a food source, and cites Karpinski's find of 900 cones under one Spruce tree [see *For. Abstr.* 12 (No. 156)] as evidence of the extent of damage. Bark gnawing, even to the extent of girdling, also occurs, particularly on Spruces, Oaks and Larch, necessitating premature felling; a *Sequoia* was found partly ringed in summer. Over a 6-month period from August the author found that a single squirrel had destroyed 2,666 cones and a woodpecker (*Dryobates major*) 1,809 cones, estimated to have contained a total of 2,237 g. of seed.

3415. Wolryche-Whitmore, G. C. **Fencing against rabbits.** *Quart. J. For.* 45 (1), 1951 (47–9 + 3 photos).

Advocates the use of creosoted wooden pale fencing, instead of wire netting, to protect plantations from sheep and rabbits. Though costing more, it lasts much longer, is more effective, looks better, and can be supplied from the estate woodlands.

3416. Bos, H. M. Electrische afrastering tegen wilde konijnen. **[Electric fencing against wild rabbits.]** *Ned. Boschb.-Tijdschr.* 21 (10), 1949 (309–10). [Du.]

Electric fencing with 4 wires 9 cm. apart, the bottom one 7 cm. from the ground, was not found effective against rabbits. Costs of maintenance and of destroying undergrowth were high. Figures are given showing costs of materials and labour for 1,000 m. of such a fence and of one using barbed wire and wire netting.

3417. Knocker, J. H. L. **Electric fencing.** *World Crops* 2 (12), 1950 (503–6). O.R.E.

Describes types of electric fence and their effectiveness. Such fences are more successful in enclosing livestock than in excluding wild animals.

45.3. *Insects*

See also *For. Abstr.* 12 (Nos. 2572, 2681–2, 2805–13, 2824, 3061, 3308, 3337, 3378, 3472).

3418. [Herford, G. V. B.] **The Pest Infestation Laboratory.** Pest Infestation Laboratory, Slough, Bucks. [1950]. pp. 8. P.R.

Description of the laboratory.

3419. **Notes on some natural and synthetic organic insecticides.** *Colon. Plant Anim. Prod.* 1 (2), 1950 (95–108).

A review of the origin, action, and uses of a number of the natural and synthetic organic insecticides now in common use.

3420. West, T. F., and Campbell, G. A. **DDT and newer persistent insecticides.** Chapman & Hall Ltd., London. 1950. pp. 14 + 632 + 13 photos. 2,267 refs. P.R.

A second, revised edition. Includes a section on the use of DDT against plant pests, including barkbeetles, wood borers, ambrosia beetles, Elm barkbeetles, Pine sawfly, and Spruce budworm.

3421. Influence du D.D.T. sur la microflore. **[Influence of DDT on [soil] microflora.]** *Rapp. Inst. nat. Étude agron. Congo Belge 1949*, 1950 (52). [F.]

Research on two Yangambi soils confirmed previous findings that DDT has no effect on the saprophytic microflora but appears to inhibit certain stages of the soil N cycle.

3422. SELLKE, K. Über die Tiefenwirkung der modernen Insektenbekämpfungsmittel. **[The depth of penetration of modern insecticides.]** *NachrBl. dtsch. PflSchDienst.* 30 (12), 1950 (221–7). 12 refs. [G.] [Biologische Zentralanstalt für Land- und Forstwirtschaft Berlin.]

Describes experiments to test the depth of penetration into leaf tissue of certain insecticides used to control gall aphids. Emulsions of modern insecticidal preparations have high penetrative capacity, as have esters of modern insecticides and 666 preparations. The experiments demonstrate, however, that the effects of the insecticides vary with different pests and different hosts, so that a general estimate of the penetrating power of an insecticide can rarely be made.

3423. LEKANDER, M. Skogsinsekternas uppträdande i Sverige under tiden 1741–1945. **[The occurrence of forest insects in Sweden during the period 1741–1945.]** *Medd. SkogsforsknInst., Stockholm* 39 (5), 1950. pp. 207. 270 refs. [Sw.f.] Price *Kr.*3.

Data are given under the Latin names of the insects, systematically arranged, and figures for outbreaks of the more important insects since 1896 are tabulated.

3424. ELTON, E. T. G. Overzicht der beschikbare gegevens over insectenplagen in onze bossen en andere houtopstanden in het jaar 1948. **[Review of available data on insect pests in Dutch forests and other woody growth in 1948.]** *Ned. Boschb.-Tijdschr.* 21 (11), 1949 (332–44). 8 refs. [Du.du.e.]

Cf. *For. Abstr.* 9 (No. 1898).

3425. ELTON, E. T. G., and VOÛTE, A. D. Overzicht der beschikbare gegevens over insectenplagen in onze bossen en andere houtopstanden in het jaar 1949. **[Review of available data on insect pests in Dutch forests and other woody growth in 1949.]** *Ned. Boschb.-Tijdschr.* 22 (6), 1950 (158–78). 5 refs. [Du.du.e.] [Instituut voor Toegepast Biologisch Onderzoek in de Natuur.]

3426. PERRET, J.-E., and BERGER, G. Observations et remarques sur *Capnodis tenebrionis* L. (Col. Buprestidae) au Maroc. **[Observations and remarks on *C. tenebrionis* in Morocco.]** *Rev. Path. vég.* 28 (1), 1949 (54–65). 9 refs. [F.] I.M.I.

A short life-history of the insect, which causes damage to young nursery stock.

3427. FÉRON, M. Recherches sur la ponte de *Capnodis tenebrionis* L. (Col. Buprestidae). **[Research on oviposition in *C. tenebrionis*.]** *Rev. Path. vég.* 28 (1), 1949 (66–72). 7 refs. [F.] I.M.I.

3428. BRENY, R. Petite saperde (*Saperda populnea* L.) et boutures de peuplier. **[*S. populnea* on Poplar cuttings.]** *Bull. Inst. agron. Gembloux* 18 (1/2), 1950 (33–8 + 1 plate). 7 refs. [F.flem.g.e.] E.M.B.

Most damage to young Poplar cuttings by the Poplar borer is done (1) during oviposition, and (2) during the first instar when the larvae begin to tunnel under the bark. For (1) a contact insecticide, with as permanent an effect as possible, should be applied as soon as the first bark incisions appear. For (2), a stage which is reached usually 2 or 3 weeks after oviposition, a contact insecticide is also useful, but it must be able to penetrate the fibrous matter blocking the larval chamber. Two treatments given at these stages should ensure adequate control.

3429. FRANSEN, J. J. Gevoeligheid van de eikenaardvlo vor DDT en HCH. **[Susceptibility of the Oak leaf beetle [*Haltica quercetorum*] to DDT and 666.]** *Tijdschrift over Plantenziekten, Wageningen* 55 (2), 1949 (92–5). 8 refs. [Du.e.] E.M.B.

In laboratory tests adults were killed by powders, used as contact poisons, containing as little as 0·05% DDT and 0·019% 666. Large-scale laboratory and field experiments are needed to confirm these results. Larvae were found to be much less susceptible to 666 as a contact and stomach poison than the adults; the same is probably true of DDT, but results were inconclusive.

3430. SHENEFELT, R. D. **Control of the Pine root collar weevil.** *J. econ. Ent.* 43 (5), 1950 (684–5).

Infested trees of *Pinus sylvestris* in Wisconsin were treated by pruning to a height of 4 ft. and applying emulsions of different insecticides. The emulsions were poured over the bark about 1 in. above the base of each tree. Substances used were ethylene dichloride, propylene dichloride, Chlordane, DDT, and 666. Gamma 666 (at 1 lb./1,000 trees) was the most

effective, causing 97% mortality. It is believed that it will retain its insecticidal activity for at least 2 years. [Cf. *For. Abstr.* 6 (p. 116).]

3431. Loosjes, F. E. Nogmaals proeven over de gevoeligheid van de grauwe dennensnuitkever (*Brachyderes incanus* De G.). **[Further tests on the susceptibility of *Brachyderes incanus*.]** *Ned. Boschb.-Tijdschr.* 22 (5), 1950 (133–4). [Du.]

Tests were made by dusting the insects for 30 seconds with a dose corresponding to 24 kg./ha. The insects were then left for periods up to 14 days on Pine twigs, either dusted with the same insecticide or untreated. Of the 6 insecticides used in different concentrations, 10% chlorinated Camphene, 5% DDT and 4 or 5% 666 gave the best results.

3432. Schwerdtfeger, F. Untersuchungen über die Bekämpfung des grossen braunen Rüsselkäfers (*Hylobius abietis* L.) mit chemischen Mitteln. **[Investigations on the chemical control of *H. abietis*.]** *Forstwiss. Cbl.* 69 (12), 1950 (689–703). 10 refs. [G.]

Numerous commercial insecticides were tested, both in the laboratory and in the field, for their effectiveness against *Hylobius abietis* and their cost. Different methods of control are discussed and evaluated. Protective spraying with preparations containing a high % of DDT gives the best results; 666 emulsions also form effective sprays, and are cheaper, though their effects are not so lasting.

3433. Rausch, H. Neue Wege der Rüsselkäferbekämpfung. **[New methods of controlling *Hylobius abietis*.]** *Forst u. Holz.* 6 (5), 1951 (67–8). [G.]

Describes a method of controlling *Hylobius abietis* by steeping bundles of Spruce brushwood for a day in a solution of *E605f* and setting them in the forest as traps.

3434. Régnier. État actuel des recherches sur les hannetons et les vers blancs. **[Present state of research on *Melolontha melolontha* and its larvae.]** *C.R. Acad. Agric. France* 36 (18), 1950 (714–22). 12 refs. [F.] A.P.B.

A summary of results from French researches begun before the war and pursued intensively since 1946.

3435. Biliotti, E. Incidences des traitements aériens contre les hannetons sur la faune entomologique. **[Effects of aerial control operations against *Melolontha melolontha* on the rest of the insect fauna.]** *C.R. Acad. Agric. France* 36 (18), 1950 (722–5). 14 refs. [F.] A.P.B.

Presents preliminary observations made after dusting with a preparation containing 10% 666. In general no important changes in the rest of the insect population were observed.

3436. Prisyazhnyuk, A. A. Primenenie geksakhlorana dlya bor'bȳ s lichinkami khrushchey. **[Use of 666 for the control of chafer grubs.]** *Agrobiologiya* 1950 (5), (141–2). [Russ.] [Belorusski Lesotekhnicheski Institut, Minsk.] A.P.B.

In 1949, heavy infestations of chafer larvae were successfully controlled in nurseries in Orlov and Kursk provinces by working 100–200 kg./ha. of 12% 666 dust into the soil in late June. The dust was also toxic to wireworms, but not to earthworms, nitrifying bacteria or tree seedlings. The efficacy of the insecticide increases with increasing soil temperature (effect poor below 10° C.) and soil moisture.

3437. Guillaume, A. Essais de lutte contre les bostryches qui, en ce moment, ravagent nos forêts de conifères. **[The control of barkbeetles, now working havoc in our conifer forests.]** *C.R. Acad. Agric. France* 36 (14), 1950 (557–60). 3 refs. [F.] A.P.B.

Good results in barkbeetle control in France were obtained with insecticidal rifle grenades, resembling tear-gas grenades and containing 200–300 g. of S.P.C. [a derivative of benzene hexachloride]. These grenades are used during the flight season for dusting tree crowns, while the lower branches and trunks are treated by means of a new French type of dusting machine.

3438. Voûte, A. D. Optreden en bestrijding van de letterzetter (*Ips typographus* L.) in ons land. **[Occurrence and control of *Ips typographus* in our country.]** *Ned. Boschb.-Tijdschr.* 22 (1), 1950 (1–4). [Du.]

3439. Reckmann, G. Kampf dem Fichtenborkenkäfer (*Ips typographus* L.) bei Massenvermehrung. **[Control of *I. typographus* outbreaks.]** Deutscher Zentralverlag, Berlin O 17. 1949. pp. 256. [G.g.] Price [£1. 11*s.* 6*d.*]

Describes the control of *Ips typographus* in Sachsen-Anhalt in 1948–49, with an account

of the organization involved, some relevant biological data, and descriptions and discussions of the measures (both mechanical and chemical) which were used.

3440. Maksymov, J. Untersuchungen über den krummzähnigen Weisstannenborkenkäfer *Ips curvidens* Germ. während seiner Massenvermehrung 1947–49 in der Schweiz. **[Studies of *Ips curvidens* made during the 1947–9 infestation in Switzerland.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 26 (2), 1950 (499–581). 53 refs. [G.g.f.]

Compares morphology, anatomy, life history, and form of galleries, for *Ips curvidens*, *I. spinidens* and *I. vorontzowi*, and discusses control measures.

3441. Živojinović, S. Scolytidae planine Golije. **[Scolytidae found in the Golija range.]** *Glasn. šum. Fak., Beograd* No. 1, 1950 (299–310 + 11 photos). 9 refs. [Serb.g.]

A survey carried out in July 1948 showed that the population of Scolytidae was abnormally high on conifers in the Golija range and that 18 species were present; 6 species were found on both Spruce and Fir, 8 on Spruce alone and 4 on Fir alone. The species causing most damage on Spruce were *Ips typographus*, *Pityogenes chalcographus*, *Pityophthorus micrographus* and *Polygraphus polygraphus*, and on Fir *Pityokteines curvidens*, *P. vorontzowi*, *P. spinidens*, *Cryphalus piceae* and *Pityophthorus micrographus*.

3442. Mielke, J. L. **Rate of deterioration of beetle-killed Engelmann Spruce.** *J. For.* 48 (12), 1950 (882–8). 12 refs.

Examination of beetle-killed stands in Utah and Colorado indicate that dead Engelmann Spruce will remain standing and sound for at least 20 years.

3443. **[Nursery pests of *Entandrophragma utile*.]** *Rep. For. Adm. Sierra Leone 1949*, 1951 (5).

In all nurseries in the Kenema Division, considerable difficulty was experienced with seedlings of *E. utile*, which were first attacked by a mite disease of leaf and stem and later by scolytid borers. The removal and burning of all plants showing signs of the mite disease, and the maintenance of heavy shade, seem to have checked the trouble.

3444. Barnes, H. F. **Gall midges of economic importance. IV. Gall midges of ornamental plants and shrubs.** Crosby Lockwood & Son Ltd., London. 1948. pp. 165. 343 refs. Price 15*s*.

Includes gall midges found on *Buxus*, *Crataegus*, *Rhus* and *Tamarix* spp.

3445. Barnes, H. F. **Gall midges of economic importance. V. Gall midges of trees.** Crosby Lockwood & Son Ltd., London. 1951. pp. 270 + 8 plates. 445 refs. Price 15*s*.

Arranged under hosts in two alphabets (coniferous and broadleaved species), with indexes of generic, specific and vernacular names of gall midges, host species, and a general index.

3446. Schneider-Orelli, O. Der gegenwärtige Stand der schweizerischen Untersuchungen über *Dreyfusia nüsslini*. **[The present status of Swiss research on *D. nüsslini*.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 26 (2), 1950 (837–60 + 2 photos). [G.g.f.]

3447. Fluiter, H. J. de. Over de voedselplanten van de zwarte bonenluis, *Aphis* (*Doralis*) *fabae* Scop. **[The food plants of *A. fabae*.]** *Tijdschrift over Plantenziekten, Wageningen* 55 (2), 1949 (69–87). 25 refs. [Du.du.e.] E.M.B.

Laboratory experiments and observations in experimental gardens and the arboretum at Wageningen showed that other plants, including *Viburnum opulus*, *Philadelphus* spp., and *Deutzia* spp., besides *Euonymus* spp., may serve as winter hosts. Fundatrix larvae transferred to *V. opulus*, *Philadelphus* spp., *Pyrus communis*, and *Sorbus aucuparia* in the arboretum developed normally, but on *Deutzia scabra*, *Magnolia stellata* var. *rosea*, and *Buxus sempervirens* they developed very slowly. Transfer of larvae to *Pyrus malus*, *Syringa*, *Lonicera*, *Hedera helix* and *Ilex aquifolium* var. *angustifolia* gave negative results.

3448. Maksimović, M. Prilog biologiji štitastih vašiju i njihovih neprijatelja na bagremu, hrastu i šljivi. **[An addendum to the biology of *Lecanium* species and their enemies on Robinia, Oak and Plum.]** *Glasn. šum. Fak., Beograd* No. 1, 1950 (337–51 + 2 photos). 15 refs. [Serb.e.]

The *Lecanium* species (probably *L. pulchrum*) found on Oak differs from that found on Robinia and Plum (*L. coryli*), in that the ascent takes place earlier and the descent later, the average size of the hibernating larvae is less, the development of the fixed larvae is more rapid, and the species is less subject to parasite attack. The part played by *Brachytarsus nebulosus*, *Coccinella septempunctula*, *C. bipunctata*, *Exohomus quadripustulatus*, and an unindentified wasp, in reducing the numbers of *Lecanium* is discussed.

3449. CUMMING, M. E. P. **Forest Insect Survey Notes.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (6), 1950 (3).

The European scale *Lecanium corni* was thought to be killing young American Elm in a field shelterbelt near Regina, Sask. An extensive survey showed that 11·6% of the 608 trees in the shelterbelt were dead and many more were unhealthy. One-half of the dead trees had been severely infested with the scale, the other half only lightly infested or not at all. Most of the dead trees were in a part of the belt that had been heavily pruned. The scale probably lowered the vitality of infested trees, but is not considered to have been the primary cause of death.

3450. HERON, R. J. **Starvation of larvae of the Larch sawfly.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (6), 1950 (2).

During heavy infestations of the Larch sawfly [*Pristiphora erichsoni*] it is not uncommon for the host tree to be completely defoliated, so that the larvae may be starved. A laboratory study of the consequences of inanition on larval development and growth showed that, under the conditions of the experiment, Larch sawfly larvae in the 5th (final) instar showed little resistance to the rigours of inanition. When the starvation period exceeded half the normal feeding period, larval mortality was *ca.* 100%. It would seem, therefore, that exhaustion of the food supply, even during the final stages of larval development, would have a very marked effect in reducing populations of this insect.

3451. MULDREW, J. A. ***Mesoleius aulicus*, a parasite of the Larch sawfly.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (6), 1950 (2).

This ichneumon fly was imported into Canada some 40 years ago and proved very successful in controlling outbreaks of Larch sawfly [*Pristiphora erichsoni*]. Since 1940, however, there have been indications that this parasite is exerting practically no control in the present Larch-sawfly outbreak in Manitoba and Saskatchewan. Although a high % of sawfly larvae are parasitized by *M. aulicus*, the proportion of parasites to reach maturity and kill their hosts rarely exceeds 5%. Evidence collected to date indicates that the failure of the eggs to hatch is the result of an acquired reaction on the part of the host. The development of the parasite is inhibited by blood cells collecting round the parasite egg in the body of the host larva, and forming a capsule round it. This reaction has apparently not yet been acquired by sawflies in British Columbia, where the parasite is still effective.

3452. FRANSEN, J. J. Onderzoekingen omtrent de gevoeligheid van de larven van de lariksbladwesp *Lygaeonematus laricis* Htg. voor stuifpoeders. [**Tests on the susceptibility of *L. laricis* larvae to dusts.**] *Ned. Boschb.-Tijdschr.* 23 (2), 1951 (33–4). [Du.]

In August 1940, Larch branches each with 22 to 69 half grown larvae were cut off and dusted in the laboratory with 150 mg. derris, pyrethrum or $BaSiF_6$ powders or with 300 mg. of preparations containing $CaCN_2$. These quantities are equivalent to 25 and 50 kg./ha. After 7 days, the dead and living larvae were counted and the latter transferred to untreated branches and re-counted after 5 days. Results are tabulated. Derris powder in concentrations of $\frac{1}{4}$ and $\frac{1}{3}$% gave satisfactory results. The $CaCN_2$ preparations were also effective, but their use would increase danger of fire. Pyrethrum and $BaSiF_6$ are of no practical value against larvae of *L. laricis*. In a second series of tests 20 larvae were dusted and placed on untreated branches. Dusting with 50% $CaCN_2$ killed the larvae; 25% also killed them but only after considerable feeding damage. Derris powder was less effective than when used as a stomach poison. Pyrethrum was no more effective, but $BaSiF_6$ gave better results as a contact poison. The number of larvae was too small for the results to be conclusive and no figures are therefore published.

3453. FRANSEN, J. J. Proeven en waarnemingen nopens de bestrijding van de sparrebladwesp (*Lygaeonematus abietum* Htg.) met chemische middelen. [**Experiments and**

observations on the control of *L. abietum* with chemicals.] *Tijdschrift over Plantenziekten, Wageningen* 55 (5), 1949 (254–61). 26 refs. [Du.e.] E.M.B.

Laboratory and field tests are described and results in practice discussed. The laboratory tests shows that: (*a*) when pyrethrum powders are used, a content of 0·025% pyrethrenin is needed to kill the larvae; (*b*) Na_2SiF_6 gives better control than $BaSiF_6$. Preliminary experiments with DDT gave inconclusive results. The following results were obtained in the field tests: (1) A powder containing 25% $CaCN_2$ gave complete and one containing 12½% gave satisfactory control. (2) Powders containing 40% Na_2SiF_6 gave effective control, but those containing 20% or less did not; in practice, a 30% content would probably be effective. The cost of such a powder would be considerably higher than that of $CaCN_2$. (3) A powder containing 0·025% pyrethrenin gave effective control. (4) A content of at least 0·25% rotenone in derris would be needed to give control, but the results obtained were inconclusive. (5) Powder containing 0·5% DDT gave satisfactory control in preliminary tests, but the results cannot be considered conclusive; a similar powder gave inferior results in the laboratory. In practice, $CaCN_2$, pure or in 50% mixture with dolomite, more effectively controlled outbreaks in 1942 and 1943, but caused extensive needle-scorch. Tree susceptibility varied considerably; most had recovered by the following season, but some were so badly damaged that they had to be felled. Tests showed that scorching was caused by dusts containing as little as 12½% $CaCN_2$. Dusts containing 40% Na_2SiF_6 caused severe, those containing 10–20% slight, and those containing 5–10% little if any scorching. Because of this damage, neither of these otherwise promising powders is suitable. German and Swiss experiments are briefly discussed. [Cf. *For. Abstr.* 5 (63).]

3454. [Breny, R., and Detroux, L.] Le 'lophyre roux' à la Reid, en 1949. **[*Neodiprion sertifer* in Belgium in 1949.]** *Abstr.* in *Bull. Soc. for. Belg.* 58 (2), 1951 (68–71). [F.]

Describes an outbreak of this insect and the nature of the damage done. The different methods and substances used for control are discussed. Dusting with strong concentrations of 666 or *E*605 gave effective control.

3455. Shepherd, R. F. **Lodgepole needle miner, *Recurvaria milleri* Busck.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (6), 1950 (3).

A study of the bionomics of the Lodgepole needle-miner disclosed a hitherto unobserved egg-laying habit. At the time when the moths were expected to be ovipositing, intensive examination was made of the foliage, but only a few eggs were found on the needles or twigs. Most of the eggs were found in small groups within the old mines, 1–3 mm. from the exit hole. This peculiarity of the moths' laying eggs in the old mines suggests the possibility of a 'snowballing' effect causing more eggs to be laid on already heavily attacked trees.

3456. **Gypsy moth control.** *Rep. N.Y. St. Conserv. Dep. 1949*, 1950 (80–2).

Describes the several kinds of survey which are regularly carried out for the purpose of spotting centres of infestation.

3457. Luteršek, D. Prilog poznavanju bionomije *Calosoma sycophanta* L. i *Calosoma inquisitor* L. kao neprijatelja gubara. **[A study of the biology of *C. sycophanta* and *C. inquisitor* as predators of the gypsy moth.]** *Glasn. šum. Fak., Beograd* No. 1, 1950 (353–65). 8 refs. [Serb.g.]

An account of a laboratory study of the life history of the 2 *Calosoma* species.

3458. Vasić, K. Prilog poznavanju uzroka poremećaja seksualnog indeksa u erupciono-kritičnom stadijumu gradacije gubara (*Liparis dispar* L.). **[The causes of the disturbance of the sex ratio in the eruptive/critical stage of gipsy-moth outbreaks.]** *Glasn. šum. Fak., Beograd* No. 1, 1950 (311–36 + 4 photos). 10 refs. [Serb.f.]

Studies made in 1948 and 1949 during gipsy-moth outbreaks in Serbia and Bosnia, including dissections of 11,330 pupae to determine the incidence of parasites, show that in Jugoslavia the later stages of population increase of this pest are not the 'prodromal' and 'eruptive' stages of Escherich. Marked population increase is confined to 2 successive years—(1) the 'pre-eruptive' stage (year) in which there is no widespread defoliation, parasitization is low, degeneration of the ♀s is absent and the sex ratio is either normal or weighted in favour of the ♀s; (2) the 'eruptive/critical' stage (year) in which a mass outbreak is regularly accompanied

by a crisis, symptoms of which are widespread defoliation, mass larval migrations, larval diseases, appearance of degeneration and abnormalities in the ♀s, and—most characteristically—a disturbance of the sex ratio so that ♀s become rare.

Of the many possible factors contributing to this disturbance, the most important is that ♀ larvae are more liable to parasite attack, e.g. in Serbia the %s attacked were 34 for ♀s and 19 for ♂s, in Bosnia and Herzegovina the corresponding figures were 57 and 40, and in Macedonia 35 and 21. The chief reasons for this apparent preference on the part of the (tachinid) parasites are probably the larger size, less active behaviour and longer period of larval development of the ♀ larvae.

3459. ROHMEDER, E. Ursachenforschung für die Züchtung einer nonnenfrasswiderstandsfähigen Fichtensorte (Untersuchung über Austreibezeit und chemische Nadelzusammensetzung an nonnenbefressenen und nichtbefressenen Fichtenstämmen). **[Preliminary explorations in breeding a variety of Spruce resistant to nun-moth attack. (Investigations into time of shoot formation and chemical composition of needles of Spruce attacked by *Lymantria monacha* and those resistant to attack).]** *Forstwiss. Cbl.* 67 (2), 1948 (110–9). [G.g.] [Institut für Forstsamenkunde und Pflanzenzüchtung der Forstlichen Forschungsanstalt München.]

During a nun-moth outbreak in central Franconia in 1938 several trees were found almost completely untouched in the middle of a severely infested area. Chemical investigations showed no significant differences in content of wax, turpentine, oil etc., in needles of unattacked and those of infested trees. The immunity seemed to be entirely due to the fact that the trees were late in forming the new shoots essential to the nun-moth larvae in their first stages. [Cf. *For. Abstr.* 8 (No. 2744).]

3460. KADAMBI, K. **Teak defoliation.** *Indian For.* 77 (1), 1951 (64–70 + 5 photos). 5 refs.

As a result of extensive observation of Teak plantations, the author considers that the most important factor (apart from those directly affecting multiplication of the insect) in Teak defoliation by insects, is the condition of the leaf at the time of larval emergence. Early flushing often permits a tree to escape defoliation because its leaves are too tough for the larvae by the time they start feeding. Early flushing is apparently sometimes the result of inherent factors, and trees displaying it should be used for breeding purposes. At other times early flushing is due to an abundant supply of ground moisture, which suggests the possibility that defoliation could be controlled in irrigated plantations by standardizing the method and frequency of irrigation.

3461. DILS, R. E., and DAY, M. W. **Effect of defoliation [by *Malacosoma disstria*] upon the growth of Aspen.** *Quart. Bull. Mich. agric. Exp. Sta.* 33 (2), 1950 (111–3). 3 refs.

Measurements with the dial-gauge dendrometer on 4 defoliated, and 3 uninjured trees of *Populus tremuloides* of 5–7 in. d.b.h., indicated that 25% defoliation resulted in 38%, and total defoliation in 67% reduction in radial growth during the current vegetative period.

3462. ECKSTEIN, K., and SCHWERDTFEGER, F. Kiefernspinner (*Dendrolimus pini* L.). **[*Dendrolimus pini*.]** *Flugblatt, Biologische Zentralanstalt Braunschweig, Ludwigsburg* No. *M*10, 1950. pp. 7. [G.]

A description of the insect, means of forecasting outbreaks, and control measures.

3463. PEPE, G. La processionaria del pino **[*Thaumetopoea pityocampa*.]** *Monti e Boschi* 2 (2), 1951 (51–8). [It.f.e.]

Reviews recent experiments in chemical control of the Pine processionary moth [cf. *For. Abstr.* 12 (Nos. 767–8)], and briefly describes experiments in the artificial introduction of red ants (*Formica rufa*) into the nests of *T. pityocampa* on Monte Penici near Pavia. This last method appears to be worth further trial.

3464. NIZI, G. Resistenza della processionaria del pino alle alte e basse temperature. **[Resistance of the Pine processionary moth [*Thaumetopoea pityocampa*] to extremes of temperature.]** *Riv. Ecol.* 1 (3/4), 1950 (193–201 + 4 photos). [It.e.] E.M.B.

Laboratory experiments on larvae of *T. pityocampa* indicated that subjection to high temperatures (20–40° C.) for periods of 12–48 hr., caused premature pupation and reduced the % of adults emerging. Low temperatures (– 4° to – 20° C.) for periods of 12–48 hr. were

much less harmful, provided that the return to higher temperature was made gradually. A sudden change from very low to relatively high temperature resulted in considerably increased mortality. These experiments were necessarily made on larvae outside the nests, and since the nest would normally provide considerable protection against very low temperatures and rapid changes of temperature, it is probable that the common belief is correct, that an unseasonably warm spring is more lethal to this species than a very cold one.

3465. Švolkovskis, A. Priežu pumpuru tinēja *Evetria* (*Retinia*) *turionana* Hb. epidemija Latvijas PSR priežu apmežojumos 1945–1947. [**The epidemic of *Evetria turionana* in Latvia's new Pine stands from 1945 to 1947.**] *Mežsaimniecības Problemu Instituta Raksti, Latvijas PSR Zinātņu Akademija, Rīgā* No. 1, 1949 (141–50). 3 refs. [Lat.]

From 1945–47, *Evetria* has been observed on a large scale in Latvia's Pine stands and has done much damage. The outbreak is ascribed to the existence of even-aged Pine stands which at the time of the investigation were 8–18 years old, i.e. at the most susceptible stage for attack. In many stands all the trees have been damaged and in some, wholesale mortality is occurring. A mixture of broadleaved trees, especially Birch and Alder, appears to check the spread of the pest and on certain sites such mixed stands have escaped attack. Fungi or insects play little part in control.

3466. Cramer, H. H. Die geographischen Grundlagen des Massenwechsels von *Epiblema tedella* Cl. Ein Beitrag zur Autökologie des Fichtennestwicklers. [**The geographical basis of variations in populations of *E. tedella*. A contribution to the autecology of the species.**] *Forstwiss. Cbl.* 70 (1), 1951 (42–53). Numerous refs. [G.] [Forstzoologisches Institut der Universität Göttingen.]

The effective distribution of this monophagous species is smaller than its potential range, since in some regions absence of the host (*Picea abies*) constitutes a limiting factor. It is likely that *Epiblema tedella* would follow an extension of the range of *P. abies*, particularly to the west and south. The area within which optimum conditions for the species are found and in which outbreaks are likely to occur is very limited, however, lying well within the effective range. Here *E. tedella* often occurs as a secondary pest, but cannot be exclusively regarded as such, since it often attacks healthy stands also.

3467. Wellington, W. G., Turner, K. B., and Belyea, R. M. **Physical and biological indicators of the development of outbreaks of the Spruce budworm, *Choristoneura fumiferana* (Clem.) Lepidoptera: Tortricidae).** *Repr.* from *Canad. J. Res.* 28*D* (6), 1950 (308–31 + 1 photo). 36 refs.

An historical survey of some known outbreaks of Spruce budworm in north-eastern North America showed a recurrence of several physical and biological phenomena in the 3–4 years before such outbreaks. (1) The number of cyclonic centres passing annually through the affected areas decreased, so that outbreaks occurred during periods of decreasing or minimum storminess. (2) Precipitation was below normal; summer droughts were the most common, but spring and autumn droughts were sometimes associated with them. (3) Radial increment in basal sections of host trees from moderately dry sites decreased, presumably in response to decreased precipitation. (4) In areas of Ontario where forests contained much Poplar as well as Balsam Fir, heavy feeding on the former by *Malacosoma disstria* preceded severe outbreaks of budworm, and there were some indications of a similar association in western Quebec and in New Brunswick.

It is considered worth testing the value of these phenomena as indicators of future outbreaks. Examination of available evidence suggests that forest composition (e.g. proportion of mature Balsam Fir) provides the conditions for outbreaks, but that relaxation of climatic control is the immediate cause of rapid build-up of budworm populations to epidemic proportions. Recognition of the existence throughout north-east North America of an endemic population which reacts to relaxation of climatic control in suitable foci, is preferable to the assumption that an infestation can spread over distances up to 1,000 miles.

45.4. *Other Animals*

See also *For. Abstr.* 12 (No. 2814).

3468. Tarjan, A. C. **Investigations of meadow nematodes attacking Boxwood, and the therapeutic value of sodium**

selenate as a control. *Phytopathology* 40 (12), 1950 (1111–24). 26 refs. (*Contribution, Maryland Agricultural Experiment Station, Division of Plant Pathology* No. 2186.)

Observations were made on oviposition and hatching of the nematodes (*Pratylenchus*), uniformity of infection in *Buxus sempervirens* var. *angustifolia* and var. *arborescens*, and the effects of different control measures using Na_2SeO_4. Solutions applied to the soil temporarily reduced nematode populations in and around the roots. Powder proved more effective at a first trial, but the results were not confirmed by a second experiment when plants were sampled 1 month after treatment. Dips up to 1 hour in hot water containing 200 p.p.m. of Na_2SeO_4 destroyed all meadow nematodes in the roots, but only at temperatures and immersion periods lethal to some of the plants. [Cf. *For. Abstr.* 11 (No. 3356).]

46. DAMAGE BY MAN

See also *For. Abstr.* 12 (Nos. 2867–8).

3469. SHAW, E. W. **A tree shield to prevent skidding injury.** *J. For.* 49 (1), 1951 (45–6).

Describes a method of constructing shields to protect the base of young trees along skidding tracks. The shields (illustrated) are made from 55-gal. oil drums (4 from 1 drum).

3470. MAGINI, E. Note sull'effetto della decorticazione su piante adulte di *Robinia pseudoacacia* L., *Cedrus libanotica* Lk., *Populus nigra* L., e *Sophora japonica* L. [**The effects of barking on adult plants of *R. pseudoacacia, C. libanotica, P. nigra* and *S. japonica*.**] *Nuovo G. bot. ital* (*n.s.*) 56 (4), 1949 (678–9 + 1 tbl.). [It.it.] A.P.B.

During the fuel famine of July 1944–February 1945, pieces of bark of varying width and from near ground level to a height of 1·5–2 m. were torn off many trees in parks etc. in Florence. Observations were made on 20 trees (8–12 m. high) of *Robinia pseudoacacia*. At the first inspection (June 1945) it was apparent that callus formation had begun at the edges of the wound, and this continued rapidly until the autumn of 1945. Observations continued to be made at irregular intervals until the autumn of 1946. The effects of barking were found to depend less on the area or maximum width of the wound than on the ratio of the latter to the total circumference. The effects of barking are not, however, continuously proportional to maximum relative width of wound; there is a maximum value (85–90%) beyond which the tree dies, and a minimum value (20–30%) below which no appreciable effects occur. Between these extremes, however, the effects of barking (in lack of vigour, reduction in increment etc.) were directly correlated with maximum relative width of wound. The examples of the other species were too few to give valid results, but it seems clear that the Poplars were much more susceptible than *Robinia* to this type of damage.

47. INJURIES OF ALL KINDS TO INDIVIDUAL TREE SPECIES

See also *For. Abstr.* 12 (Nos. 2650, 3270).

3471. NORDIN, V. J. **A gall disease of Western Hemlock in British Columbia.** *For. Chron.* 26 (4), 1950 (308–9).

A gall or tumour-like growth (illustrated) of unknown origin occurs on the twigs, branches and stems of *Tsuga heterophylla* in several parts of British Columbia and Vancouver Island. In one area on the Queen Charlotte Islands, 68% of the Hemlock understorey was found to be affected. The disease occurs typically on understorey Hemlock growing in a shaded damp habitat, but is not uncommon on trees of timber size. On these larger trees, gall formations seem to be restricted to the upper third of the bole, but on saplings they may occur close to ground level. In extreme cases the galls may cover the main stems and branches of the hosts. In some cases the disease is undoubtedly a part cause of the death of the tree.

3472. JACQUIOT. De diverses causes entrainant le dépérissement des chênes. [**The various factors leading to the die-back of Oak.**] *Bull. Com. for., Paris* 14 (83), 1950 (1308–10 + 2 photos). [F.]

The forest research station at Nancy recently organized an inquiry into the die-back of Oak in various parts of France. It was concluded that die-back was the result of three causes:—(1) *Climatic*: A succession of dry years had lowered the watertable on some sites. (2) *Edaphic*: On some sites, where the watertable is normally kept in equilibrium by the water

consumption of the forest stand, some accidental factor (e.g. rabbit damage, defoliation by *Tortrix viridana*, or excessive felling) can upset that equilibrium and provoke a rise in the watertable. The trees then die from root asphyxiation. This phenomenon is often aggravated by the general neglect of upkeep of forest drains. (3) Attack by *Agrilus biguttatus*: In some parts of the Vosges, of Touraine, and in the neighbourhood of Paris, the dying Oaks (all of them old enough to have formed rough bark) had blackish exudations on their trunks. If the bark near the exudations was carefully removed, galleries of the buprestid *Agrilus biguttatus* were always found. These galleries do not usually extend beyond the phloem, where they cause an unimportant local necrosis; but when they penetrate to the cambium they induce a reaction which results in the formation of abnormal tissues. The necrotic cambium is replaced by a new layer formed by the dedifferentiation of a layer of external phloem parenchyma cells, which causes an enclave of phloem tissue to form in the wood. In addition, the normal vessels of the adjacent sapwood, as well as the abnormal vessels formed by the cambial replacement, are obstructed by tyloses, which prevent the ascent of water in the affected area. If the trunk is penetrated by a number of galleries, the water supply may be cut off altogether and the tree dies rapidly. The mechanism by which the *A. biguttatus* attack produces these abnormalities in the anatomy of the tree trunk, is obscure. There is no evidence for a secondary fungus or virus infection, and the author inclines to the hypothesis that the insect secretes a hormone which in high concentration has a toxic effect (necrosis of cambium and phloem) but at lower concentrations, at a distance of a few millimetres, provokes de-differentiation and proliferation of the phloem parenchyma.

5. MENSURATION. INCREMENT. YIELD

51. WEIGHTS AND MEASURES

3473. MUNNS, E. N., HOERNER, T. G., and CLEMENTS, V. A. **Converting factors and tables of equivalents used in forestry.** *Misc. Publ. U.S. Dep. Agric.* No. 225 (rev.), 1949. pp. 48.

Tables include:—conversion factors for length, area, weight, volume etc.; equivalent measures of rainfall per unit area, reservoir capacities and flow of water; approximate quantities of forest products represented by 1,000 bd. ft.; basal area in sq. ft. from given diameters; quarter-girth equivalents; log rules; vertical aerial-photo scale relations; number of seeds per unit weight, and seeds and plants per unit area; and the relations between discharge of water, and time and area of run-off. Alignment charts are given for conversion of temperatures, lengths, areas, volumes, etc.

3474. PRINCE, E., and PRINCE, H. [Revised by R. L. B. Sim.] **The Prince timber ready reckoner.** Ernest Benn Ltd., London. New ed., 1950. pp. 90. Price 7*s.* 6*d.*

The new edition serves a dual purpose:—(1) to convert linear feet to Petrograd standards, and (2) to convert cost/standard to cost/linear foot.

3475. RAPRAEGER, E. F. **The cubic foot as a national log-scaling standard.** *Sta. Pap. Nth. Rocky Mt. For. Range Exp. Sta.* No. 24, 1950. pp. 25. 5 refs.

Existing log rules and the advantages (such as simplicity of measurement, uniformity, and validity for the pulping and veneering industries for which the board-ft. scales are of little value) of a cubic-ft. rule are discussed. Some standard rules for scalers, to give nation-wide uniformity, are suggested.

52. MEASUREMENT OF TREES AND TIMBER

3476. HOHENADL, W. Einführung forstlicher Buchungsmaschinen. [**The introduction of calculating machines in forestry.**] *Forstwiss. Cbl.* 68 (1), 1949 (11–21). [G.]

Describes a calculating machine which can be used in conjunction with self-registering calipers when estimating stand volume by Hohenadl's method. [Cf. *For. Abstr.* 12 (No. 803).]

52.1. *Diameter*

3477. VALLIERE, G. **Extra handle for metal calipers.** *Woodl. Sect. Index Canad.*

Pulp Pap. Ass. No. 1121 (*A*-2-*b*), [1950]. pp. [1].

Describes an extra handle which can be attached to the fixed arm of steel tree calipers to facilitate opening. The handle consists of a piece of $\frac{1}{8}$-in. steel welded to the arm and covered with two pieces of wood.

52.2. *Height. Length*

3478. KER, J. W. **A test of the accuracy of tree height measurements taken by Abney level and chain.** *B.C. Lumberm.* 35 (1), 1951 (58, 60). 1 ref. [University of British Columbia, Vancouver.]

Total heights were measured by Abney level and chain of 95 Douglas Firs and 26 Western Hemlocks which were then felled and measured accurately. The average deviation standard error of estimate and coefficient of variation for the 2 species are shown in graphs. Calculated heights for Douglas Fir are within 1·4% of the true height twice in 3 times and within 2·8% 21 times in 22; the average heights for a group of 5 trees, as might be used for determining site index, should be within 0·7% of the true average twice in 3 times, and within 1·4% 9 times in 10. Errors to be expected in calculating heights of individual Hemlock trees are less well defined but should be less than 2·3% twice in 3 times, and less than 4·6% 21 times in 22. All expressions of error tend to increase with the actual height but the coefficient of variation shows most stability.

3479. MIRKOVIĆ, D. Prilog proučavanju metoda za određivanje srednje visine sastojine. **[A contribution to the study of methods for evaluating the average height of [forest] stands.]** *Glasn. šum. Fak., Beograd* 1, 1950 (169–204). 14 refs. [Serb.f.]

The accuracy of various methods is examined, taking as a criterion the deviations from the mean heights in accordance with Lorey's formula. Enunciation of the theoretical bases of the various methods is followed by a series of tables and graphs giving the results of trial measurements and evaluation of the mean height for 24 experimental stands, by seven methods: (*a*) Lorey's formula used with a height curve, (*b*) the height of the tree of mean b.a. as read from the height curve, (*c*) the mean of the actual heights of stems whose diameter corresponds to that of the tree of mean b.a., (*d*) the mean height of stems having the b.a. of (Wiedemann's and Laer's) 'Zentralstamm', (*e*) the ratio of Σ (b.a. $\times$ h.)/Σ b.a., the individual products b.a. $\times$ h. being calculated from the actual values for all stems, (*f*) the mean of the actual heights of all stems in the stand, and (*g*) the mean height of all stems on two transects taken E–W and N–S (Maletić). Method (*d*) gives rather too high, and method (*g*) too low results, method (*e*) being in between. For the evaluation of site quality, methods (*b*), (*d*) and (*g*) are all practical and sufficiently accurate.

52.3. *Form*

3480. FEKETE, Z. A lúcfenyö alakviszonyai az egykorú faállományban. **[Comparative stem form of Spruce in an even-aged stand.]** *Erdész. Lap.* 86 (4), 1950 (116–21). [Hu.russ.f.]

Old data from a 98-year-old stand of *Picea abies* in which every tree was measured in sections at the time of felling, were used to compile two tables of practical value. These give, respectively, the mid- and top-diameter of the merchantable bole for different lengths (expressed as a % of total height) and d.b.h.'s from 20 to 70 cm.

Other tables and graphs show the frequency of taper classes as determined by diameter quotients taken at every 10th of total tree height; comparative data from other sources; and derived figures showing for a given d.b.h. and total height, the diameters at every metre from stump level.

3481. BRYANT, B. S. **The significance of specific gravity distribution with respect to tree form.** *For. Cl. Quart.* 24 (1), 1951 (18–24). 9 refs.

A study was made of 4 stems of White Pine (age not stated) in order to test Volkert's hypothesis [cf. *For. Abstr.* 11 (No. 1096)] that trees are beams of uniform resistance. Use was made of analytical techniques worked out for glued laminated beams having laminae of different specific gravity [cf. *For. Abstr.* 10 (No. 1996)]. Resistance to bending was determined at several heights on each of the 4 stems and plotted against height. The hypothesis was apparently borne out by the generally straight-line relationship of resistance to bending and height in all 4 curves except for a consistent discontinuity at the butt swell. The mathematical relationship between strength and

specific gravity apparently does not hold in the area of butt swell, possibly because of the difference in the microstructure of the wood (e.g. in the so-called fibril alignment) in this region. It is pointed out that the results of this study cannot be assumed to hold good for trees of other species and ages.

52.4. *Measurement of Volume*

3482. Ilvessalo, Y. **On the correlation between the crown diameter and the stem of trees.** *Commun. Inst. for. Fenn.* 38 (2), 1950. pp. 32. [E.e.fi.]

With a view to the possibility of calculating tree volume from air photographs, careful measurements were made of 2,815 sample trees (felled for the construction of volume tables) in 1- to 2-m. sections. A correlation was established between maximum crown diameter and d.b.h. of *Pinus sylvestris*. By grouping the trees in 2-m. height classes, this correlation appears more clearly. The correlation between maximum crown diameter and stem diameter at the height of this crown diameter is almost as high as that between crown diameter and d.b.h.; further, there is a high correlation between these two stem diameters. These correlations indicate that the d.b.h. and volume of Pines can to some extent be estimated from the maximum crown diameter. All correlations were lower for Birch than for Pine, and were poor and uncertain for Spruce.

3483. Stoffels, A. Die Berechnung des mittleren Abrundungsfehlers bei der sektionsweisen Inhaltermittlung liegender Stämme. **[Calculating the mean rounding-off error in sectional measurement of the volume of felled timber.]** *Schweiz. Z. Forstw.* 101 (9), 1950 (473–7). 3 refs. [G.f.]

3484. Rechnen und Kalkulieren. Folge 2. Das Rundolz. **[Calculations (2). Round timber.]** *Holz-Helfer, Suppl.* to *Holz* 4 (10), 1950. pp. 2. [G.] P.R.

Contains a nomogram for calculating volume on the basis of length, stem diameter and top diameter; also an alignment chart correlating mid-stem diameter, volume and total length.

3485. Becking, J. H. Massatafels voor de bepaling van de houtmassa van opstanden van de Douglasden (*Pseudotsuga taxifolia* Britt.) in Nederland. **[Volume tables for Douglas Fir in the Netherlands.]** *Repr.* from *Meded. LandbHogesch. Wageningen* 50 (1), 1950. pp. 16. 4 refs. [Du.e.]

The Wolff von Wülfing stem-form method was used to construct the tables, which are based on data from 480 trees.

3486. Hummel, F. C., and Waters, W. T. **General volume table for Birch in Great Britain.** *For. Rec. For. Comm., Lond.* No. 7, 1950. pp. 6. Price 3*d*.

Owing to their pronounced taper in the lower portion of the stem, Birch trees of a given breast-height quarter-girth and stem length usually have smaller volumes than trees of other species. Alder, however, appears to be an exception; when applied to 266 Alder trees grown in different parts of the country, this Birch volume table gave an over-estimate of 5·8%.

Bark thickness in Birch varies within very wide limits. On the 433 trees measured, bark averaged 13% of the timber volume o.b., but in some instances it was less than 8% and in others more than 20%, and it did not seem to vary systematically either with girth or with stem length. There was, however, a tendency for slow-grown trees to have thicker bark than fast-grown trees of equal size.

3487. Johnson, F. A., Kallander, R. M., and Lauterbach, P. G. **Volume tables for Red Alder [*Alnus rubra*].** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 55, 1949. pp. 10.

The tables are based on figures from Oregon, Washington, and British Columbia.

3488. Finney, D. J. **An example of periodic variation in forest sampling.** *Forestry* 23 (2), 1950 (96–111). 5 refs.

The methods of a previous paper [cf. *For. Abstr.* 10 (No. 2999)] have been applied to the study of alternative methods of sampling certain Dehra Dun forests of northern India, for the estimation of timber volume. The data available are records of an enumeration of every fifth strip of these forests, and different schemes for sub-sampling from this sample have been considered.

The data show clear evidence of periodic variation, the period being about 170 chains in length. This has important effects on the relative precisions and efficiencies of different

types of random and systematic sampling. In general, systematic sampling was more precise than any form of random sampling at the same intensity, but this property was violently upset if the interval between successive strips of the systematic sample was a multiple of the period. The importance of this to the practice of systematic sampling, and to the problem of assessing the standard error of an estimate based upon a systematic sample, has been discussed. The conclusions must be accepted with reservations, however, because the data on which they are based relate only to a 1-in-5 sample of the forest.

Recent work [cf. *For. Abstr.* (No. 2484)] by Yates has given some theoretical guidance on how to assess an upper limit to the error of a systematic sample. Unfortunately, this seems unlikely to be of great use in forest sampling because of the amount of supplementary data required. Except perhaps for very large forests, the investigator is still forced to choose between a random sample, for which he can assess the precision, and a systematic sample, probably, but not necessarily, more precise than the random and failing to give any reliable information on its own precision. *Author's summary.*

3489. SETH, S. K. **A scheme for partial enumerations in the hills.** *Indian For.* 77 (1), 1951 (24–5 + 1 dgm.).

Orthodox sampling methods used in forestry depend upon accurate survey to locate and demarcate the sampling units. This item is chiefly responsible for the disproportionately large amount of time and money required for partial sampling as compared with total enumerations over whole compartments. A method is described which dispenses with survey almost altogether, as it makes use of the detail given in large-scale survey maps both to locate the sampling units on the ground and to determine their areas accurately. Its chief utility is for sampling in the hills, because it is possible to mark out comparatively small (30–75 acres) sampling units on survey maps. Stratified sampling with enumeration of two sampling units per block is advocated and the expression for calculating the fiduciary limit of the mean growing stock per acre is given. The question of weightage to allow for differences in areas of sampling units is discussed. *Author's summary.*

53. SOLID CONTENTS OF STACKED MATERIALS

3490. WORTHINGTON, N. P., and TWERDAL, M. P. **Contents of a cord of eight-foot pulpwood.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 69, 1950. pp. 6.

Studies on the solid content of stacked Douglas Fir and Hemlock pulpwood gave the following results: (1) For both species there is a definite relation, shown in tables and graphs, between the contents both of solid wood and of wood and bark, and the diameter of the average bolt. (2) Bark volume for Douglas Fir was about 11·1% and for Hemlock 10·8% of the total volume of wood and bark. (3) At any given diameter, the 2 species have nearly the same bd.-ft. volume per cord, ranging from 365 bd. ft. at 8 in. average diameter to 650 bd. ft. at 20 in. (4) Hemlock is significantly heavier than Douglas Fir. The estimated green weight varies from 4,300 to 5,350 lb. per cord, depending on species and bolt size.

54. FACTORS CONNECTED WITH ASSORTMENT

3491. CAMPBELL, R. A., PRICE, H. R., and MORIN, R. A. **Timber estimating by tree grade.** *Sth. Lumberm.* 181 (2273), 1950 (243–5).

The system of grading developed at the Southeastern Forest Experiment Station is based on the quality of the butt log. A definite relationship has been established between its quality and that of the upper logs. Specifications for grading, showing the minimum d.b.h., minimum clear length, number of clear sections, and the maximum % of defects allowed, are tabulated. Size and soundness of the butt log is assessed, the log is then squared, usually to give the maximum number of good faces, and the grade of the next to poorest face is established. Logs containing defects (knots, bumps, grubholes, etc.) above the % allowed, are reduced one grade. Tree values of some hardwoods by grade and size based on lumber yield and 1949 values are shown in graphs.

55. AGE

3492. WHITFORD, P. B. **Estimation of the ages of forest stands in the prairie-forest border region.** *Ecology* 32 (1), 1951 (143–7). 7 refs.

Two possible methods of determining how long a forest may have existed on a given site

were explored. (1) Clone ages for forest herbs that reproduce mainly by vegetative means may be estimated from the size of a clone and the rate of growth of the species, giving an approximate minimum age of the stand. (2) By ranking tree species in three shade-tolerance classes, and calculating the 'DFD index' (sum of % values of density, frequency and dominance) for each class in each stand, a grading of stands in order of ecological age is possible. The results of these two methods are compared with the minimum ages determined from ring counts of stumps or the diameter of standing trees. Results agreed sufficiently well to make it clear that both methods deserve further study.

3493. Ferguson, C. W., Jr. **Early height growth in Douglas Fir.** *Tree-ring Bull.* 17 (3), 1951 (18–20). 3 refs.

The age, as distinct from the ring count on increment cores, of trees used for dendrochronological studies, is occasionally required. To obtain the total age, a small number of years of estimated height growth has usually been added to the length of the ring record at the sampling level. In order to provide a better basis for such estimates, a study was made of Rocky Mountain Douglas Fir. Core samples of young trees ranging from 2 to 12 in. in d.b.h. and from 15 to 50 ft. in height, were taken on several sites in Montana, Colorado, and Arizona. Cores were taken at 3 levels:—(A) 6–12 in. above ground level, (B) 33½ in. (2 lengths of the increment borer) above (A), and (C) 33½ in. above (B). The data (tabulated) show that the average growth rate between levels (A) and (B) was only *ca.* half that of the growth between levels (B) and (C). The maximum suppression recorded in this study was noted in a tree growing at a low altitude on a dry site, which took 24 years to grow the first 33½ in. above level (A) and 15 to grow the second. The most rapid growth noted was 5 years for the first 33½ in. and 3 for the second. It is probable that there is a corresponding variation in seedling growth below the height level (A) of the borings reported here.

56. INCREMENT

See also *For. Abstr.* 12 (Nos. 2572, 2693, 2820, 2824, 2830, 2832, 2937, 2939, 2941, 3354, 3461, 3493).

3494. Godske, C. L., Marstrander, J. H., and Schieldrup Paulsen, H. Forstmeteorologiske undersøkelser i Os prestegårdsskog sommeren 1944. **[Investigations in forest meteorology at Os [near Bergen] during the summer of 1944.]** *Bergens Museums Årbok 1945: Naturvidenskapelig Rekke* No. 2, 1947. pp. 16. 3 refs. [Nor.e.] L.S.

The close relationship between temperature and length of the terminal shoot is shown in graphs and tables of measurements made in 1944 on Pine, Spruce, Western Hemlock, Silver Fir and Sitka Spruce. [Cf. *For. Abstr.* 5 (26–7).]

3495. Fabricius, L. Haben die Sonnenflecken Einfluss auf den Zuwachs der Fichte? **[Do sunspots affect the growth of Spruce?]** *Forstwiss. Cbl.* 68 (2), 1949 (73–5). [G.]

Annual-ring measurements, covering the years 1920–47, on 50 Spruce trees, were plotted and compared with records for sunspots during the same period. No relationship between the two sets of values could be established nor between the occurrence of sunspots and amounts of precipitation. [Cf. *For. Abstr.* 4 (258); 7 (No. 1562); 10 (No. 2328).]

3496. Nagel, J.-L. Influences des éléments météorologiques sur l'accroissement des forêts. Seconde partie: l'indice d'aridité. **[The influence of meteorological factors on the growth of forests. Part 2: the index of aridity.]** *Schweiz. Z. Forstw.* 101 (10/11), 1950 (512–30). [F.g.]

In the author's earlier studies [cf. *For. Abstr.* 10 (No. 3005)] in the Val-de-Travers, he was dependent on meteorological data from a station 25 km. distant and at a lower altitude. The present article reports the results of studies made in a forest only a few km. from the meteorological station, and at the same altitude. The following meteorological data for the years 1906–49 are plotted against increment for the same period:—mean precipitation, relative humidity, temperature, insolation, and index of aridity for the vegetative period. For index of aridity he uses the formula of de Martonne:

$$i = \frac{P}{T + 10}$$

where P = annual precipitation in mm., and T = mean temperature in degrees C. Analysis of the data for the period 1945–49 shows that the index of aridity was below 40 for 33 months or 55% of the period, and below 20 for

16 months or 27% of the period. When it is considered that an index of 50–60 is that for the typical Fir-forest zone, 40–50 for mixed Fir and Beech, and 20–40 for temperate deciduous forest, the decline of vigour of Fir in Switzerland during this period is fully accounted for. The symptoms of decline are often beetle attack, mistletoe infestation etc., as well as reduction in increment. The future of Fir in the foothills of the Jura is discussed.

3497. HOLMSGAARD, E. Studier over højdetilvækst, kroneudvikling, oprensing m.v. i unge bøgebevoksninger i Skåne. [**Studies on height increment, crown development, self-pruning, etc., in young Beech stands in Skåne.**] *Medd. SkogsforsknInst., Stockh.* 39 (1), 1950. pp. 82. 41 refs. [Dan.dan.e.]

Results of measurements relating in the main to the period 1942–47 on 5 sample plots in 25- to 35-year-old natural stands are shown in graphs and tables and are summarized. The average height increment is shown to vary from year to year; this variation may be caused by the weather during the preceding summer. The height increment of individual trees varies considerably in different years and cannot be explained by variations in weather. Among trees of equal height, those with the greatest crown projection tend to have the greatest height increment. The length of the lateral branches, and the height increment of the lowest trees, are more influenced by light than by weather. There is considerable variation, dependent on the weather, between breadth of growth rings from year to year but little variation in the average breadth over a number of successive years. The increase in basal area for succeeding years can be more accurately predicted from previous increase than from the size of the crown. The crown projection can be expressed as a rectilinear function of the basal area of the stem. Branch angles vary, but decrease with height above the ground, averaging 35° at a height of 7–8 m. The thickness of the lowest living branch can be expressed as a rectilinear function of its length, of the crown diameter, or of the d.b.h. Considerable differences exist between the average height above ground of the lowest living branch, the lowest dead branch and the lowest occlusion. The height above ground of the lowest living branch is approximately the same whatever the height of the tree. Among trees of equal height, those with the greatest crown diameter have the lowest living branches. In the stands investigated, the crown ratio (length of living crown divided by height of tree) was at its lowest at a stand height of 7–8 m.

3498. MCINTEER, B. B. **Tree-ring study in Kentucky, II.** *Castanea* 15 (4), 1950 (160–72). 8 refs.

In the Big Barrens, a narrow strip of prairie more than 200 miles long in Kentucky, there is a fairly close correlation between the area of prairie vegetation and the geological formation, which is cavernous limestone. Tree vegetation on the prairie is sparse, whereas good forest growth exists on either side. Tree-ring studies were made on *Liriodendron tulipifera* in 3 geological regions (viz. Chester cavernous limestone and Borden or Waverly shale) to see if the growth of the trees was similarly affected by the extremes in periodic rainfall. Tabulated results are presented [cf. *For. Abstr.* 9 (No. 1940)]. The trees of the cavernous-limestone region are slightly more affected by variations in rainfall than those of the other two regions. The author suggests that a severe drought may at some time have affected the vegetation of this region.

3499. LAWRENCE D. B. **Estimating dates of recent glacier advances and recession rates by studying tree growth layers.** *Repr.* from *Trans. Amer. Geophys. Union* 31 (2), 1950 (243–8). 14 refs.

Study of the growth rings of trees growing along the margins and below the terminus of a present-day receding glacier, reveals the minimum lapse of time in years since the glacier advanced beyond a given point, and the approximate rates at which recession has occurred. Study of cross-sections of trees pushed part way over by ice pressure at the time of maximum glacier advance and left in a tilted position to continue growth until the present, discloses the exact year of the maximum advance. This is detected through a change in form of growth rings in the trunk cross-section. Growth while the tree is erect is concentric about the growth centre; that after trunk tilting is asymmetric. The non-conformity between concentric inner growth and excentric outer growth, marks the year of the tilting. This technique and others described

here may be used to date landslides, wind storms, and river floods, as well as glacier fluctuations. *From author's summary.*

3500. GLOCK, W. S. **Cambial frost injuries and multiple growth layers at Lubbock, Texas.** *Ecology* 32 (1), 1951 (28–36). 16 refs.

A study of the use of frost injuries for exact dating of growth rings in dendrochronology.

3501. EKLUND, B. Skogsforskningsinstitutets årsringsmätningsmaskiner: deras tillkomst, konstruktion och användning. **[The development, construction and use of the Forest Research Institute's machines for measuring annual rings.]** *Medd. SkogsforsknInst., Stockh.* 38 (5), 1949. pp. 77. 5 refs. [Sw.sw.e.]

Some instruments used in the past in Sweden and Finland for measuring annual rings are described, and the instrument now used by the Swedish Forest Research Institute is described in more detail, with photographs. It consists of a measuring microscope connected by a gear box to a calculating machine. There are 3 possible arrangements of the gear box—to record up to 9·99 mm., with an accuracy of 0·01 mm., to record up to 99·9 mm. with 0·1-mm. accuracy and to double the measured distance, so giving diameter instead of radial readings. The carriage of the adding machine is wide enough to take a form suitable for further calculations, on which measurements can be recorded directly. The microscope can be disconnected, and the adding machine used to obtain results at a given stage or to complete calculations. The increment core is lit by a specially designed microscope lamp; the green light used reduces eye-strain and facilitates distinction between spring and summer wood in the same annual ring. It is estimated that when only actual measurement was included, 1,819 annual rings (1,121 when spring and summer wood were measured separately) could be measured in 1 hr.; when all the preliminary and incidental operations were included, the figures were 600 (500) annual rings per hr.

3502. URBANOVSKI, A. Veličina konstanti u nekim prostim formulama za određivanje prirasta i procenta prirasta. **[The value of constants in some simple formulae for evaluating the increment and increment % of trees.]** *Glasn. šum. Fak., Beograd* No. 1, 1950 (205–30). 7 refs. [Serb.f.]

The values of the constants in formulae of Levaković, Schneider and van der Flitt were examined on 27 Beech trees, analysis of which gave data for 303 stems ranging from 30 to 220 years. It was found that: (1) the value of the constant a in Levaković's formula

$$z_v = a \times z_g \times hf$$

(where z_v = volume increment, z_g = basal increment, h = height, and f = form factor) varies between 0·97 and 1·81 for all age classes, while the mean values vary from 1·09 to 1·35, increasing up to 90 years and then falling rapidly from 90 to 140 years; (2) the value of the constant K in Schneider's formula

$$P_v = \frac{Ki}{D}$$

(where P_v = volume increment, i = width of growth ring, and D = diameter) varies from 361 to 1,184, the great majority of stems (91·84%) varying from 400 to 800; the constant/age linear correlation coefficient is − 0·37; the constant/increment % linear correlation coefficient is + 0·46; the pd (h)-factor/constant linear correlation coefficient is − 0·34; (3) the van der Flitt formula

$$P_v = \frac{30(D-d)}{D}$$

was transformed into

$$P_v = \frac{K}{20} \times \frac{D-d}{D}$$

(where K is the Schneider-formula constant and D and d the final, and earlier, diameter, respectively), thus enabling more accurate results to be obtained. The use of mathematically inexact formulae can be simplified and more exact results obtained if the laws of the variation of the respective constants are known.

3503. BURGER, H. Holz, Blattmenge und Zuwachs. X. Die Buche. **[Wood, quantity of foliage and increment. X. Beech.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 26 (2), 1950 (419–68 + 4 photos). 36 refs. [G.g.f.]

This study follows the same general lines as its predecessors [cf. *For. Abstr.* 10 (No. 1479)] dealing with other species, and is based on data for 114 individual trees. The results, which are shown in graphs and tables, relate to (1)

Wood properties—specific gravity of heartwood and sapwood, green and dry; water and air content of living wood; shrinkage; and twisted grain. (2) *Crown and foliage in relation to increment in individual trees*—with data on weight of twigs; weight and number of leaves and area of foliage; crown area and crown volume; and correlations of these factors with d.b.h. and stemwood increment by volume and weight. (3) *Crown and increment relationships in stands*—with data for an 80- and for a 100-year-old stand of Beech.

3504. BURGER, H. Forstliche Versuchsflächen im schweizerischen Nationalpark. **[Forest-research sample plots in the Swiss national park.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 26 (2), 1950 (583–634 + 12 photos). 18 refs. [G.g.f.]

Follows the same general lines as other studies by the same author on wood, quantity of foliage, and increment of forest trees. This study was based on 3 trees of *Larix decidua*, 4 of *Pinus cembra*, 18 of *P. mugo*, and 6 of *Picea abies* felled in sample plots in the forest reserve of Grisons.

57. DEVELOPMENT AND STRUCTURE OF STANDS: YIELD

See also *For. Abstr.* 12 (Nos. 2935, 2941, 3514).

3505. LEVAKOVIĆ, A. O analitičkom izražavanju sastojinske strukture. **[Structure of stands—its analytical description.]** *Glasn. šumske Pokuse* No. 9, 1948 (293–366). 46 refs. [Croat.f.]

Two characteristics are shown to be sufficient to express precisely the properties of a monomodal frequency curve, such as the diameter distribution curve of a stand. The first of these is the asymmetry of the curve, which is defined by

$$a_1 = \frac{g_1}{g_1 + g_2}$$

where g_1 and g_2 are the differences between the arithmetic mean and the extremities of the lower and upper diameter classes respectively. The second is the standard deviation of the population, which is inversely proportional to the frequency of the modal class.

The two structural characteristics may be used to group stands of a common structural type, providing that the stands lie approximately within the same diameter limits.

3506. BULL, H. **Cord mortality in unthinned Pine stands.** *Sth. For. Note Sth. For. Exp. Sta.* No. 70, 1950 (1–2).

A survey of unthinned plots of Pine (mostly Loblolly but including some Shortleaf) showed an average annual mortality per acre of 0·1 cord for trees below 26 years of age, almost 0·5 for 26- to 30-year-old and 0·6 for 31- to 33-year-old trees.

3507. OLBERG, A. Maximale Wertholzleistungsfähigkeit in gleichaltrigen reinen Beständen. **[Maximum yield of high-quality timber in pure, even-aged stands.]** *Forstwiss. Cbl.* 70 (1), 1951 (1–17). 5 refs. [G.]

Taking Wiedemann's 1949 yield tables as a basis, the author calculates for Pine, Spruce, Beech, and Larch, the maximum number of individuals that reach the dimensions of high-quality timber during the life of the stand.

3508. WIEDEMANN, E. Über die Einführung von Ertragstafeln, die auf dem dGz aufgebaut sind, und über die Berücksichtigung des Sondercharakters der einzelnen Wuchsgebiete. **[The introduction of yield tables based on m.a.i., and a survey of the special nature of individual growth regions.]** *Forstwiss. Cbl.* 69 (11), 1950 (625–36). [G.]

Presents a type of yield table, which, instead of being based on the conventional site quality classes I–V, expresses site quality in terms of m.a.i. (including all intermediate yields) in solid cu.m. with gradations of 1 cu.m. Such a classification affords an absolute standard by which a direct comparison of growth of different species in different regions can be obtained. The author extracts 2 separate ages from his own conventional yield tables for Spruce, Pine, Beech and Oak, and shows the results of conversion to the m.a.i. yield table. He also makes a comparison of his own figures with those from Mitscherlich's studies of growth regions, and explores the possibility of drawing up m.a.i. yield tables for individual species in the various growth regions of Mitscherlich. M.a.i. yield tables for Pine in the warm-dry and cool-moist regions have already been drawn up, and extracts are presented.

3509. FERGUSON, J. H. A. Productieverwachtingen en dunning van *Agathis loranthifolia* Salisb. in zuivere opstanden. [**Yield prediction and thinning of *A. loranthifolia* in pure stands.**] *Meded. Bosbouwproefsta., Buitenzorg* No. 30, 1949. pp. 15. [Du.e.] *Repr.* from *Tectona* 39 (4), 1949 (368–82).

Figures are based on 4 sets of sample plots of different ages, 550–1,100 m. above sea level. Measurements are recorded for the ages 5–13, 15–31, 41–54. A graph of the 'upper height' (the average height of the 100 most dominant trees per ha.) of the different stands, indicates that they are all in the same site class. A graph of the average stand diameters is used as a basis for a table of yield expectation. Yields up to 30 years can be predicted with reasonable accuracy but as no measurements have been recorded for the ages 31–41 these predictions can be considered only as a rough guide. The m.a.i. appears to reach a climax of *ca.* 25 cu.m./ha. at 35 years and then to decline. The selection system would probably be preferable, to avoid erosion, but technical difficulties may make the use of the uniform system necessary. It is emphasized that as the seed for these stands has been collected from wayside trees, thinnings must be made to leave the best trees and to eliminate slow growers. After the age of 30, thinnings should be heavier to stimulate diameter growth. A table is given showing the recommended number of trees per ha. and relative spacing (% ratio of average distance between trees to upper height) after thinning at different ages.

3510. MATHIESEN, A. **Aspen stands, their growth and yield in the experimental forest of the University of Tartu [Estonia].** *Repr.* from *Apophoreta Tartuensia, Stockholm* 1949 (308–17). 13 refs. [E.]

The results of a study of these stands are compared with comparable data from Russia and Sweden for *Populus tremula*, and also for *P. grandidentata* in the U.S.A. Height, d.b.h., basal area and volume were measured, and formulae are given for plotting curves of these factors together with a yield table for heavily thinned, small stands of Aspen on the best soils. Some suggestions are given for the management of such stands.

6. MANAGEMENT. WORKING PLANS. SURVEYS

3511. CHAPMAN, H. H. **Forest management.** Hildreth Press, Bristol, Conn. 1950. pp. 582. Many refs. Price $6.00 (£2. 10*s.*).

Revision of a work of the same name published in 1931.

60. GENERAL LAND MANAGEMENT

60.3. *Management of Different Classes of Forest*

See also *For. Abstr.* 12 (Nos. 3558–9).

3512. LIHTONEN, V. Tutkimuksia hakkuutoiminnan voimaperäisyyden tekijöistä ja tunnuksista. [**Factors influencing the intensity of exploitation [in the state forests of Finland].**] *Acta for. fenn.* 55 (3), 1948. pp. 144. [Fi.e.]

The state forests of Finland are for the most part very inaccessible and as yet relatively untouched. The author discusses fully the various methods of transport at present in use, notably floating and rafting, and the possible extension of roads and railways to reach the forests of the northern part of the country [cf. *For. Abstr.* 11 (No. 2405)]. Maps, diagrams and tables have legends in English as well as Finnish.

3513. LIHTONEN, V. Mitä Perä-Pohjolan metsät lupaavat? [**What do the North Finland forests promise?**] *Metsät. Aikak.* 1950 (5), (123–6). [Fi.e.]

A general long-term policy for managing the forests of the Kemi river region, Lapland province, is propounded, the main feature of which would be early regeneration on a considerable scale along with controlled removal of the excess overmature growing stock. The periodic growth and drain, and the respective proportions of old, middle-aged and young forest at 20-year intervals for the next 100 years, under this plan, are shown diagrammatically.

3514. HEWETSON, C. E. **Seventy-five years fire protection in the tropics:**

Allapalli forest reserve, South Chanda, Madhya Pradesh (Central Provinces, India (Bharat)). *Emp. For. Rev.* 29 (4), 1950 (339–50 + 11 photos).

An account of the application of the principles of scientific forestry over a period of 75 years to a forest consisting mainly of Teak, in the Central Provinces of India. The first part describes the forest types and the influence of management on the composition, with particular reference to fire protection, making use of a description of the forest written in 1876–77 by Brandis. The second part gives some statistics of the growing stock and how the standing volume, increment, and time taken to reach exploitable diameter have changed; this is illustrated by figures taken from the three successive working plans of 1894–96, 1930, and 1946.

3515. **Working plans and systematic management—Mangrove.** *Rep. For. Dep. Fiji 1948 and 1949*, 1950 (6).

The Mangrove forests have been divided into reserves by provincial boundaries and into compartments by natural features, and are being worked for fuelwood on an empirical 4-year cycle. Thinnings are prescribed at 15, 25 and 35 years of age. In these operations any tree may be cut, provided that a tree of at least equal size and of the same or a superior species, is left within a distance of 3, 5, or 8 ft., respectively, of the tree felled. The final felling at the end of 40 years is a clear felling, followed, in the rare cases where it is necessary, by planting. Seed trees, if left, are liable to be thrown by hurricanes during the subsequent rotation, damaging the pole crop on the area.

3516. HAGENSTEIN, W. D. **More wood per acre.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (18–24). P.R.

A short review of progress in forest management in the Douglas Fir region (northwest U.S.A.), including case histories of operations conducted on an area of 3 million acres.

3517. BOWSER, D. C. **Private forestry in Scotland.** *Scot. For.* 5 (1), 1951 (10–6).

3518. MALSBERGER, H. J. **Farm woodland management in the South [of the U.S.A.].** *For. Chron.* 26 (4), 1950 (302–7).

3519. UZIELLI, A. Sistemazione e piani di utilizzazione dei boschi cedui del litorale maremmano. **[The regulation and plans for exploitation of coppice woods of the Maremma coast.]** *Monti e Boschi* 1 (12), 1950 (537–46). [It.f.e.]

Outlines a project for the reorganization of the woodland on a farm near Grosseto, including better utilization of coppice.

61. SURVEYING. MAPPING

See also *For. Abstr.* 12 (Nos. 3482, 3557).

3520. HÄRRY, H. De l'importance de la vue aérienne et de la mensuration aérophotogrammétrique pour la forêt. **[The importance of aerial reconnaissance and photogrammetry in the forest.]** *Schweiz. Z. Forstw.* 102 (1), 1951 (20–34 + 2 plates). [F.g.]

A general account, with some reference to Swiss practice.

3521. OSMASTON, H. A. **Photogrammetry without funds.** *Emp. For. Rev.* 29 (4), 1950 (361–2).

Short-focus spectacles may be used as a stereoscope for examining aerial photographs; besides being cheap, they have certain advantages over simple conventional stereoscopes, especially for field work. The construction of a cheap and simple pantograph is also described.

3522. STUBBS, D. A. **A portable light box for use with aerial photographs.** *For. Cl. Quart.* 24 (1), 1951 (25–7).

The box (plans given) was designed particularly for use with a lens stereoscope, but is large enough to accommodate a mirror stereoscope and a parallel bar. It can be built for less than $15.00.

3523. WILSON, R. C. **The relief displacement factor in forest area estimates by dot templets on aerial photographs.** *Photogrammetric Engineering, Menasha* 15 (2), 1949 (225–36). L.S.

Discusses the use of dot templets in this type of estimate and the tendency to error caused by relief displacement, i.e. distortions of images on vertical photographs taken over rough terrain. Many of the errors thereby caused are compensatory, but when the photographic survey covers rough topography, and particularly when it is taken with a short-focal-length lens, the dot-templet pattern should be clustered

near the photo centre. This reduces possibilities of sampling bias due to scale changes caused by relief displacement.

3524. BENSON, L. R. **The Benson area computer.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1126 (*A*-2-*b*), [1950]. pp. 3 + 1 dgm.

A method, claimed to be faster and more accurate than the dot-counting method is described. In place of the dots, solid lines at intervals of 4 mm. (which in practice averaged 0·1564 in.) are ruled on tracing cloth and printed on transparent foil or directly on to the map. The calculator, which is illustrated, is a lucite bar, with a slide, and calibrations from 1 to 100 are etched on it. These are spaced at 0·1599 in., and the reading on the bar will give values of 0·025 sq. in. = 1 acre on maps with a scale of 20 chains/1 in. The slide is used to record the distances between the intersections of the line and the outline of the area to be measured on each line in turn.

64. DESCRIPTION OF SITE. ASSESSMENT OF SITE AND STAND QUALITY

See also *For. Abstr.* 12
(Nos. 2605, 2626, 2632, 2820, 2838, 3509).

3525. VINK, A. P. A., and NISPEN TOT PANNERDEN, J. E. M. VAN. Proeve van bodemkartering in een bosgebied. **[An example of a soil survey in a forest district.]** *Ned. Boschb.-Tijdschr.* 20 (8), 1948 (222–9). [Du.e.]

In a small area of sand and loess wooded with Beech and conifers, growth differences of more than 100% were found on soils differing in texture, humus and water capacity.

3526. GESSEL, S. P. **Correlation between certain soil characteristics and site for Douglas Fir in northwestern Washington.** *Repr.* from *Proc. Soil Sci. Soc. Amer. 1949* 14, 1950 (333–7). 4 refs.

Reports on a study to test the validity of a method of predicting site class for Douglas Fir from soil-profile groups [cf. *For. Abstr.* 12 (No. 1638)] related to annual precipitation. The tests, made on soils of glacial origin in northwestern Washington, establish the applicability of the method to this area.

3527. FERGUSON, J. H. A. Enkele gegevens betreffende de ontwikkeling van gelijkjarige *Pinus merkusii*-opstanden. I. Voorlopige boniteringstabel. II. De invloed van het plantverband. **[Some data on the development of even-aged stands of *P. merkusii*. I. Preliminary site-class table. II. The influence of planting distance.]** *Rapp. Bosbouwproefsta., Buitenzorg* No. 34, 1950. pp. 20 + 2 gphs. [Du.e.jav.]

Site-class tables have been drawn up for *P. merkusii* on the basis of the many data available for ages up to 20 years. Where possible the tables have been extended, from the slight data available, to cover ages up to 45 years, to give a rough estimate of future growth. Seven site classes have been distinguished; in N. Sumatra classes 5–6 seem to be normal in natural stands. The effect of planting space on the number and diameter of stems in unthinned stands is illustrated from sample plots in Java. Tables are given showing relative spacing (the % ratio of average distance between trees and upper height), number and average diameters of stems for different site classes, planting distances and ages. A further table shows the age at which the first thinning is 'early', 'urgent' or 'too late' for different site classes and planting distances, and the average stand diameter at these ages. Experience suggests that a planting distance of 3 × 2 m. gives good stem form and branch clearance, one of 3 × 3 m. gives irregular results, and those of 3 × 4 and 4 × 4 m. often encourage extensive damage by *Eupatorium pallescens*, a serious weed in W. Java. Legends to graphs and tables are in Dutch and English.

65. DESCRIPTION OF GROWING STOCK

See also *For. Abstr.* 12
(Nos. 2820, 3505, 3514).

3528. **[Composition of N. Queensland rain forest.]** *Rep. Qd. For. Serv. 1949–50*, 1950 (6).

A survey of ½-acre plots mechanically located at 30-chain intervals in strips 50 chains apart, was made over an area of 5,000 acres of rain forest in N. Queensland. The resulting data showed that:—(1) The primary or more valuable species are very poorly represented. (2) Of a total basal area of 190 sq. ft./acre, only 40 sq. ft. was in good trees of useful species.

(3) The prime cabinet woods, Maple (*Flindersia brayleyana*), Walnut (*Entandrophragma palmerstoni*), and Red Cedar (*Cedrela toona* var. *australis*), are likely to be ousted by the more vigorous regeneration of Bollywood (*Blepharocarya involucrigera*) on the grey soils, and by Red Tulip Oak (*Argyrodendron peralata*) on the rich red loams, unless this tendency can be corrected by treatment.

66. YIELD REGULATION. SUSTAINED YIELD

See also *For. Abstr.* 12 (Nos. 2586, 3513, 3514–5).

3529. BRASNETT, N. V. **The Brandis system of yield regulation.** *J. Oxf. Univ. For. Soc.* (*Ser.* 3) No. 5, 1950 (15–22).

A detailed exposition of the method devised by Brandis in 1858 to regulate the yield of Teak from the forests of Burma.

3530. MALLET, J. Une méthode d'aménagement simple. [**A simple system of management.**] *Rev. for. franç.* 3 (2), 1951 (110–5 + 4 photos). [F.]

A defence of the fixed-periodic-block system against the strictures of L. Schaeffer. [Cf. *For. Abstr.* 12 (No. 1640).]

3531. LEROY, R. La possibilité mixte dans les futaies jardinées. [**The mixed method of yield regulation in selection forest.**] *Bull. Soc. for. Franche-Comté* 25 (16), 1950 (657–71). [F.]

In 1947 the author propounded a method of regulating yield in selection forest by a mixture of area and volume [cf. *For. Abstr.* 9 (No. 649)]. He here discusses several objections which have been put forward, and difficulties that have arisen in the application of this method, now called 'la possibilité mixte'.

3532. MEYER, H. A. Vorratszunahme und Nutzung im ungleichaltrigen Wald. [**Increase of growing stock and fellings in uneven-aged forest.**] *Schweiz. Z. Forstw.* 102 (2/3), 1951 (119–32). 3 refs. [G.f.]

The author develops a formula $(q^{z/4}-1)\,100$ (where q = the mean ratio of the number of stems in two 4-cm. consecutive diameter gradations, and z = mean annual diameter increment) for determining the % increase of growing stock (increment of initial stand + recruitment) for any given period. The ratio q, for 4-cm. diameter classes, varies between 1·25 and 1·35 in well balanced selection forest. In forest under successive regeneration fellings it may rise to 1·45. Its progressive diminution betokens over-conservative treatment. It is emphasized that, from the economic point of view, it is the *gross* increase of growing stock and not just the increment of the initial stock, that is of importance.

7. FOREST ECONOMICS, VALUATION, AND FINANCE

See also *For. Abstr.* 12 (Nos. 2588, 2877, 2927, 2939, 2942, 2959–60, 3092–3, 3270, 3329–31, 3543).

3533. GREIDANUS, G. De toepassing van de vervangingswaardetheorie bij de kostprijsberekening in de bosbouw. [**The application of the theory of replacement value to the calculation of cost price in forestry.**] *Ned. Boschb.-Tijdschr.* 21 (3), 1949 (61–6). [Du.]

Different methods of calculating cost price are discussed; one which applies the replacement rather than the cost value both to planting costs and to interest on them is preferred.

3534. RÜEDI, K. Zur Frage der Bewertung des Waldbodens insbesondere bei Enteignung. [**The valuation of forest soil, especially in connexion with expropriation.**] *Schweiz. Z. Forstw.* 102 (1), 1951 (69–73). [G.]

Cf. *For. Abstr.* 12 (No. 849).

3535. TROMP, P. H. M. Een rentabiliteitsberekening voor Lariks en Douglas. [**An estimate of the profitability of Larch and Douglas Fir [based on current prices in Holland].**] *Ned. Boschb.-Tijdschr.* 20 (9), 1948 (253–5). [Du.]

3536. CALLIN, G. Om framställningskostnader och gränsdimensioner för småvirke. [**Production costs and minimum dimensions for small wood.**] *Medd. Skogsforskn-Inst., Stockh.* 38 (6), 1949. pp. 54. 6 refs. [Sw.sw.e.]

The d.b.h. and top diameter to which timber is extracted appear to be the main factors in cost of production; graphs are given showing that cost of felling and transport rise rapidly

with increasing diameters. Tabulated figures show that when markets are poor (i.e. when minimum marketable dimensions are high) a much smaller increase in price or decrease in labour costs is needed to make the smaller dimensions profitable than when markets are good. Similarly a greater saving of wood occurs from a decrease in minimum diameters when markets are poor. The present labour shortage in Sweden is an important factor, because more labour is needed per volume unit for the small dimensions. It is hoped that the development of chemical industries may increase the market for small wood. The figures on which the survey is based are drawn from time studies on timber, pulpwood and firewood of the more usual dimensions. Data for the smallest dimensions are therefore scarce.

3537. Soom, E. Rückaufwand und Wegabstand. [**The cost of skidding and the spacing of forest roads.**] *Schweiz. Z. Forstw.* 101 (10/11), 1950 (546–60). [G.f.]

Analysis of a number of skidding operations into their component parts showed that the time occupied in actual transport was only 20% of total time for the operation, irrespective of methods or length of time taken. More detailed analysis was made of typical horse-skidding operations taking into account volume skidded, topography, method of attaching logs, depreciation of equipment etc. When total costs were plotted against distance skidded the resulting curve rose steadily, but when costs were taken in terms of cu.m./m. of journey, and plotted against total length of journey, the curve started high, dropped to its lowest point at 350 m. and then rose steadily. This rise in the costs over long distances is common to all skidding operations, though the point at which it occurs varies with methods employed and must be determined for each type of operation, in order to find the optimum distance for skidding. When a road network already exists, the choice of skidding methods will be that for which the optimum distance most nearly coincides with the spacing of roads. When planning a road network the object of spacing should be to make it such that half the distance between roads equals the optimum skidding distance for the most convenient method. In the example taken (horse skidding), the most economical distance was found to be 350 m., and having regard also to cost of road construction, the optimum spacing of roads would be 520 m. apart (skidding on a 45° slope). In order to prevent undue injury to reproduction when using such wide road-spacing, it might be necessary to establish permanent skidding tracks.

8. FOREST ADMINISTRATION

See also *For. Abstr.* 12 (No. 3543).

82. LABOUR QUESTIONS

See also *For. Abstr.* 12 (Nos. 2936, 3071–6, 3554).

3538. Rodary. L'instruction des ouvriers forestiers dans le Bade sud. [**The training of forest workers in south Baden.**] *Rev. for. franç.* 3 (2), 1951 (116–23). [F.]

3539. Heikinheimo, L. Maaseudun työvoimarvarojen arvioinnin tarpeellisuus. [**The necessity for assessing man-power potential.**] *Metsät. Aikak.* 1950 (3/4), (81–3). 4 refs. [Fi.e.]

A discussion of the general problem of under-employment, emphasized by the resettlement of the displaced Karelian population on the so-called 'dwarf' farms (0·25 to 5 ha. of arable). These will total about 190,000 or 50% of all the farms in the country and will generally not supply a livelihood. Forest work can give employment only in winter. Reliable statistics of the extent and periodicity of this concealed unemployment are a necessary precedent to any positive policy for fully employing these people, the need for which is becoming increasingly urgent. The writer urges that a special survey be undertaken in conjunction with the 1950 general and agricultural censuses.

3540. Ouwehand, M. Arbeidsverhouding in het Noorse Staatsbosbeheer. [**Working conditions in the Norwegian State Forest Service.**] *Ned. Boschb.-Tijdschr.* 22 (4), 1950 (108–10). [Du.]

3541. MacDonald, D. A. **Employment and unemployment in forestry in Canada.** *Proc. World For. Congr.* No. 3, 1950 (287–303). [E.]

9. FOREST POLICY

90. GENERAL PRINCIPLES OF FOREST POLICY

See also *For. Abstr.* 12 (Nos. 3512–3, 3567).

3542. Simeunović, D. S. Planska rekonstrukcija šumarstva FNR Jugoslavije. [**The planned reconstruction of forestry in Jugoslavia.**] *Glasn. šum. Fak., Beograd* No. 1, 1950 (1–39). [Serb.f.]

The 5-year plan for forestry in Jugoslavia aims at: controlled management of 3,000,000 ha. of existing forests; reforestation of 240,000 ha.; reduction of felling to the level of annual increment; increased mechanization in logging and construction of forest roads; greater centralization of sawmilling and an increase in the proportion of other wood-using industries; education of forest workers and encouragement of research.

3543. Hiley, W. E., Gill, P. J., and Constantine, A. K. **An economic survey of forestry in Kenya and recommendations regarding a Forest Commission.** [Kenya Government.] 1950. pp. 61. Price 2*s*.

The report of a Committee appointed in January 1950 to conduct an economic survey of the forest estate in Kenya. The Committee spent 3 months on the survey and report. The terms of reference were:—(1) to consider the existing constitution of the Forest Department and its finances; (2) to consider and report on the proposal to establish a Forest Commission; (3) to examine the assets and potential revenues of, and necessary expenditure on, the forest estate, with a view to determining whether the administration of the forest estate as a self-financing unit is likely to be a sound financial proposition; and (4) to make recommendations on rates and methods of collection of royalties.

It is recommended that a Forest Commission be formed which should be organized as a business concern and be self-financing, and mainly concerned with the management and extension of the plantations of exotic conifers. The maintenance of the protection forests, which have little merchantable value, should remain as a permanent responsibility of the Forest Commission, the cost being borne as a part of their normal expenditure. If, at some future time, it should be considered desirable to undertake considerable new work, such as the afforestation of dry mountainous areas for the purpose of conserving water, special votes might be required. With the railways now adopting oil fuel, the creation of more fuel plantations should be restricted to the needs of the local population for firewood. It is proposed that the annual loss to the Forest Fund from the financing of native forest reserves, should be repaid from other colonial revenues; and that the cost of financing the Forest Commission, at the proposed rate of planting, until it becomes self-supporting, should be met by increased felling, and doubling the royalties on standing timber.

Recommendations are made for changes in staff structure and functions. The pensionable staff of the Commission should remain members of the Government service, and the Commission should reimburse the Government for all emoluments and other financial commitments in respect of them. All temporary and contract staff should be direct employees of the Commission.

3544. **Forest policy.** *Council Paper, Legislative Council, Fiji* No. 5, 1950. pp. 4.

3545. Schaeffer, L. L'aménagement esthétique et récréatif des forêts. [**Management of the forest for aesthetic and recreational ends.**] *Rev. for. franç.* 3 (1), 1951 (21–30). 15 refs. [F.]

91. SOCIAL AND ECONOMIC INFLUENCE OF THE FOREST. NATIONAL PARKS. RESERVES. FOREST INFLUENCES

91.1. *Rural Preservation. Reserves. National Parks. Plant and Animal Protection*

See also *For. Abstr.* 12 (Nos. 3566–7).

3546. **Britain's forests: Tintern.** H.M. Forestry Commission, London. 1950. pp. 18. Price 9*d*.

3547. **Britain's Forests: Coed y Brenin.** H.M. Forestry Commission, London. 1950. pp. 16. Price 6*d*.

3548. La protection de la nature. Numéros spéciaux. **[Nature protection: special numbers.]** *Rev. for. franç.* 2 (12), 1950 (687–746). [F.]

Contain a number of articles on various aspects of nature protection, with special reference to conditions in France.

3549. PRIOTON, J. Les réserves de reconstitution forestière. **[Forest restoration reserves.]** *Rev. for. franç.* 3 (1), 1951 (1–20). [F.]

Gives some account of existing forest reserves in the Mediterranean region of France, and discusses the need for reserving other areas of degraded forest to permit of their restoration.

3550. DETTI, E. Pianificazione regionale e il destino delle pinete a levante di Viareggio. **[Regional planning and the future of the Pine woods east of Viareggio.]** *Monti e Boschi* 1 (12), 1950 (552–61). [It.f.e.]

Deals with the Pine woods round Viareggio in Tuscany, which are threatened by the growth of the town as a seaside resort.

91.3. *Influence of the Forest on the Environment*

See *For. Abstr.* 12 (Nos. 2606, 2618–9, 2635, 2644–6, 2813).

92. FOREST LAW

See also *For. Abstr.* 12 (Nos. 3270, 3566).

3551. DESCH, H. E. **Trees and the law [in the United Kingdom].** *Wood* 16 (2), 1951 (66–8).

Discusses the legal definitions of 'timber', 'underwood' and 'coppice', and the legal position as regards overhanging branches and damage done by roots to adjacent buildings or roads, quoting actual judgments.

3552. RICARD, R. **French legislation on reafforestation and the replanting of forests.** *Legislative Information, FAO, Rome* 1 (4), 1950 (175–86). [E.]

Reviews legislation starting with the laws of 28 July 1860.

3553. ENNEVAARA, P. A. Yksityismetsälain vastaiset hakkuut ja tämän lain valvonnan tehokkuus. **[Fellings in contravention of the [Finnish] private forest law [of 1928], and the effectiveness of the system of superintendence.]** *Acta for. fenn.* 54(2), 1949. pp. 280. 108 refs. [Fi.g.]

3554. LINDSTRÖM, K. B. Metsätyöväen talviyhteisasuntojen rakentaminen. **[Legislation on building lodgings for forest workers.]** *Metsät. Aikak.* 1950 (11), (365–6). [Fi.e.]

Discusses briefly a new law laying down requirements for quarters used for long periods in winter.

3555. PETTERSON, H. Om skogsvårdslagens tillämpning. **[On the application of the Forest Conservation Law.]** *Medd. SkogsforsknInst., Stockh.* 39 (2), 1950. pp. 38. [Sw.e.] Price *Kr.*1.

The terms of the Forest Conservation Law of 1948 [cf. *For. Abstr.* 10 (No. 1521)] are summarized, and tables and formulae are presented for calculating the capital value of stands, the yield from thinnings, whether a forest is capable or incapable of development, and other factors affecting the application of the law.

3556. HESS, E. Die Nachhaltigkeit im Bundesgesetz betreffend die eidg. Oberaufsicht über die Forstpolizei. **[The principle of sustained yield in the [Swiss] Federal Law [of 1902].]** *Schweiz. Z. Forstw.* 101 (7/8), 1950 (317–32). [G.f.]

Explains the law and suggests desirable alterations in it.

93. FOREST RIGHTS, CONCESSIONS AND PRIVILEGES

3557. CAMPELL, E. Wie kann der Schneisenaushieb für Fernleitung auf ein Minimum eingeschränkt werden? **[How can powerline rights of way [in the forest] be reduced to a minimum?]** *Schweiz. Z. Forstw.* 101 (10/11), 1950 (565–70). [G.f.]

Shows how the length of line can be shortened and the necessary fellings reduced to a minimum by composing (1) a profile of the route with pylons drawn to scale, (2) a plan of the route showing forest stands by 5-m. height classes. Much can be done by heightening pylons or spacing them closer together. If the

fellings involved still appear to be excessive, then an alternative route must be found.

94. FOREST OWNERSHIP. CO-OPERATIVES

See also *For. Abstr.* 12 (Nos. 3517, 3546–7).

3558. HUGHES, W. G. **The development of farm woodlot licences in British Columbia.** *B.C. Lumberm.* 35 (1), 1951 (100, 102, 104).

A brief account of the system by which farmers are given licences to manage Crown land, up to a total growing capacity, with their own forest holdings, of 10,000 cu. ft. p.a.

3559. MOORE, E. B., and LENTZ, A. N. **The co-operative forest management program in New Jersey.** *J. For.* 49 (1), 1951 (31–4). 5 refs.

3560. RETTIE, J. C., and INESON, F. A. **Otsego Forest Products Cooperative Association of Cooperstown, New York: an evaluation.** *Agriculture Information Bulletin, U.S. Department of Agriculture* No. 17, 1950. pp. 42. 17 refs. Price 20 cents.

3561. MEYER, H. Erfahrungen im Güterzusammenlegungswesen. [**Experiences in the consolidation of scattered holdings.**] *Schweiz. Z. Forstw.* 102 (2/3), 1951 (132–51). [G.f.]

Urges the advantages of grouping agricultural and forest land together for enterprises in consolidation of peasant holdings.

95. FOREST TAXATION

3562. GRAINGER, M. B. **Forest taxation in Europe and New Zealand: a critical examination of the New Zealand tax system.** *Inform. Ser. N.Z. For. Serv.* No. 11, 1950. pp. 107.

As a preliminary to a critical review of the entire system of forest taxation in New Zealand, the author visited Great Britain, Sweden, Finland, Norway, and France, and a chapter apiece is devoted to the forest taxation in each of these countries. The final chapter deals with anomalies in the New Zealand system in the light of this comparative information, and suggests desirable measures of reform.

96. POLICY REGARDING PROTECTION FOREST, DEFORESTATION AND AFFORESTATION

See also *For. Abstr.* 12 (Nos. 3552, 3564, 3566–7).

3563. PERSSON, E. En ny och rättvisare giv för den Svenska skogen. [**A new and fairer deal for Sweden's forests.**] *Svenska SkogsvFören. Tidskr.* 47 (1), 1949 (17–32). [Sw.]

Tables are given showing the necessary area to be cultivated and burnt annually in order to fulfil afforestation programmes for waste and poorly stocked forest land put forward in 1944, 1945 and 1948 [cf. *For. Abstr.* 10 (No. 2375)], and to maintain land recently afforested. The estimated annual average areas for burning and cultivating on an estate of 50 ha. are respectively, 2,100 and 2,400 sq. m., calling for 3–4 working days. Further tables are given showing the area of afforestation actually carried out between 1943 and 1946, and the area not under forest during the period that needs soil cultivation before regeneration can take place. Recommendations include: a definite afforestation programme for each province, divided among different classes of forest owners; publication of annual statistics on its progress; establishment of a sinking fund for forestry; greater co-operation between forest owners, departments and the government; and a much increased state subsidy for forestry.

97. POLICY REGARDING THE RELATION OF THE FOREST TO AGRICULTURE, PASTURE, AND INDUSTRY

See also *For. Abstr.* 12 (Nos. 2574, 2599, 2613, 2933, 3561).

3564. FREEMAN, T. W. **Forestry and land use survey.** *Irish For.* 7 (1/2), 1950 (24–31). 6 refs.

Discusses problems of land use in Ireland and the need for detailed land-use surveys before making plans for afforestation.

3565. JOVANOVIĆ, S. Utvrđivanje pravilnog odnosa između šuma i poljoprivrednog zemljišta. [**Establishment of a proper proportion by area between forest and agricultural land.**] *Šum. List* 74 (5), 1950 (169–77). [Croat.russ.]

An equation is deduced for calculating the optimum proportion of forest to agricultural land from the point of view of rural manpower utilization. If y is the area under forest, x the area under agriculture, ds and dp the number of working days spent on 1 ha. of forest and of agricultural land respectively, and rs and rp the number of working days per man per year in forestry and agriculture respectively, then the most favourable % of forest area is

$$y\% = \frac{100\ dp}{dp + \frac{rp}{rs}\ ds}$$

If $rp = 220$ days, $rs = 30$ days, $dp = 31{\cdot}81$ days, $ds = 14{\cdot}7$ days, then $y\% = 22\%$.

3566. Allison, P. A. **Conservation of vegetation in Southern Nigeria.** *Fm. & For.* 10, 1950 (18–22).

An historical account of measures taken and legislation enacted to conserve vegetation and regulate shifting cultivation in S. Nigeria.

3567. Smith, G.-H. [Editor]. **Conservation of natural resources [in the United States].** John Wiley & Sons, Inc., New York. 1950. pp. xii + 552. Many refs. Price $6.00.

Covers the conservation of agricultural, forest, water and mineral resources, of wildlife, of fisheries and of men, by local and national planning, and contains chapters by T. R. Smith on tree crops (for preventing soil erosion) and by O. D. Dilller on Our Forest Resources and the Practice of Forest Conservation. [Cf. *For. Abstr.* 1 (307).]

3568. Tisdale, E. W. **Grazing of forest lands in interior British Columbia.** *J. For.* 48 (12), 1950 (856–60). 7 refs.

FORESTRY THE WORLD OVER

References: 1. *American Forests*, Washington, D.C.; 2. *Bois et Résineux*, Bordeaux; 3. *Empire Forestry Review*, London; 4. *Engineering and Chemical Digest*, Johannesburg; 5. *Foreign Commerce Weekly*, Washington, D.C.; 6. *Forest Club Quarterly*, Seattle; 7. *India News*, London; 8. *India Record*, London; 9. *Journal of Forestry*, Washington, D.C.; 10. *M.L.B.Log.*, Amherst, N.S.; 11. *Nederlandsch Boschbouw-Tijdschrift*, Arnhem; 12. *News Bulletin C.P.P.A.*, Montreal; 13. *Schweizerische Zeitschrift für Forstwesen*, Bern; 14. *Timber of Canada*, Ottawa; 15. *Timber Trades Journal*, London; 16. *Timberman*, Portland, Ore; 17. *Weekly Pakistan News*, London; 18. *Wood*, London; 19. *Wood Notes Northeastern Wood Utilization Council*, New Haven, Conn.

Conferences. Provisional arrangements are being made for the British Commonwealth Forestry Conference to be held in Canada in 1952. The Conference will meet at Ottawa late in August or early in September, and after 3 days' meeting for receiving reports, electing committees, etc., will make a tour of 10-12 days in the Maritime Provinces and Quebec. The main Conference is expected to last a fortnight, during which short visits will be made to the Petawawa experimental plantations and to pulp, paper, saw and hardwood mills within easy reach of Ottawa. After the close of the Conference there will be a tour to British Columbia for those delegates able to spare the time (**3**; March 1951).

International. In Washington, D.C., on 14 Dec. 1950, twenty-four foresters met to form the International Society of Tropical Foresters. The primary purpose of the new organization is to keep tropical foresters in touch with others in their field and with the work they are doing. It will also serve as a clearing house of information on developments and opportunities in tropical forestry as well as on recent additions to tropical forestry literature. It is planned to keep the membership in touch with developments by means of occasional memoranda or news letters. Membership is open to foresters of all nationalities working in all types of tropical forest products, including rubber. No fees are required, and those interested are urged to write to Tom Gill, 1214 16th Street N.W., Washington 6, D.C. (**3**; March 1941).

Austria. Amongst the machinery shown at the Vienna International Fair which opened 11 March 1951, was the 'Automule', a light (3·5-ton) caterpillar tractor specially designed for forestry use. It can negotiate steep slopes, and has a drive with separate gearbox for each track (**2**; 10.4.51).

Canada. The Canadian Broadcasting Corporation has placed its province-wide network at the disposal of the Ontario Department of Lands and Forests for daily broadcasts to the general public on existing forest fire hazard conditions in each fire district. The broadcasts began on April 1st and will continue at least until October 31st, normally the end of the fire season in Ontario. It is hoped that the daily warning will play a large part in preventing forest fires, by acquainting as many people as possible, especially motorists, tourists, fishermen, cottagers and others moving into or through a forested area, of existing fire hazards (**14**; April 1951).

France. A revolutionary method of producing heat and power from waste materials, invented by M. Marie Baule, is being developed by Recherches et Industrie, 56 Faubourg St. Honoré, Paris 8. Any kind of cheap organic matter can be used—stick wood, wood chips or sawdust, farm wastes, tars, garbage, city sewage. A catalyst is added in the form of metal salts, costing about the same as common salt, which can be used over and over. An electric current is then passed through the material, 220 volts at 50 cycles. The result is a production of producer gas, 1 kWh of current being required per cu.m. of gas. From a kilogram of material with a BTU value of 16,000, it is claimed that gas with a BTU value of 15,000 can be produced, or an efficiency of 90%. The gas may be burned in a furnace like other forms of gas, or it can be used to operate a turbine for producing power. Since the gas must be cooled first, there is an additional return in the form of hot water, heated in this cooling process to 212° F. Definite applications and costs are still to be determined (**19**; Jan. 1951).

Great Britain. The report of H.M. Chief Inspector of Factories for 1949 shows that 10 fatal and 5,595 non-fatal accidents occurred in saw-mills and wood-working shops during the year. Circular saws accounted for 1,256, planing machines for 556, and vertical spindle moulders for 211 accidents (**15**; 28.4.51).

The Royal Reception Suite on the South Bank site for the Festival of Britain is heptagonal in shape, and from each corner glued laminated timber arches converge into a laminated ring about 6 ft. in diameter, 21 in. deep and 4 in. thick. The roof covering is of stressed-skin plywood panels. The laminated arches and ring are of Douglas Fir clear, and the plywood is exterior grade Douglas Fir. All timber and plywood was reduced to 14% moisture content. Cold-setting casein glue was used. The Timber Development Association acted as consultants on the constructional details (**18**; April 1951).

Iceland. Satisfactory results have been obtained in the experiment in which 100,000 small Pines from the north of Norway were planted out in Iceland in 1949, and in recent months a further 280,000 trees have been flown to Reykjavik by Scandinavian Airline planes [Cf. *For. Abstr.* 10 (p. 275).] (**11**; March 1951).

India. The celebration of 'Vana Mahotsava' during 1950 evoked a wide response. It is reported that 30 million trees were planted as against a target figure of 10 million, and it is considered reasonable to suppose that at least 1 in 5 of these will survive.

A scheme for the exploitation of the North Andaman Forests has been drawn up. When in full operation, it is expected to yield an annual revenue of Rs. 5 million, in addition to making the tea chest, match, and other industries independent of imported materials (**8**; 18.4.51).

The planting of Milk Trees [? *Couma sapida*] was the subject of a question in the Bombay Assembly. The Minister of Agriculture said that the nutritional value of the 'milk' had not yet been ascertained. A scheme for the introduction of these trees in Bombay State, wholly financed by the Indian Council of Agricultural Research, had been sanctioned by the Bombay Government for a period of 3 years at a total cost of Rs. 3,750. It was proposed to obtain seed of the Milk Tree from Venezuela and plant them in various localities of Bombay State (**7**; 17.3.51).

Pakistan. The paper mill now building at Chandragaon near Chittagong will be the largest in Asia. The chief raw material will be Bamboo from the Chittagong Hill Tracts forest within a 40-mile radius of the mill. Consumption is expected to be 100,000 tons p.a. (**17**; 12.5.51).

Sweden. Pulp, paper, timber, and certain timber products exported from Sweden have been subjected to a price-equalization tax effective from 1 Jan. 1951, as part of the Government's programme to maintain economic stability and retard the inflationary effects of international price movements on the internal Swedish price structure. The various trade associations will collect the tax from their members, while exporters who are not members of such associations will pay the tax directly to the government. All funds collected under the tax are to be deposited in special blocked accounts in the National Debt Office, where they will be retained on a non-interest-bearing basis. Seventy per cent of the funds collected will be returned to industry over a 5-year period beginning in 1958 unless business conditions warrant repayment earlier. The remaining 30% is to be divided among social and welfare foundations within the industries concerned, and a fund set up to promote better care of private forests (**5**; 9.4.51).

A new and improved type of 'Boliden salt' for the impregnation of timber against fungus and insect damage has been developed by the Boliden Mining Co. In this improved compound, precipitation of the practically insoluble arsenates in the wood from cellulose reaction is not accompanied by the formation of soluble natrium salts. The result is a higher degree of concentration than in the old 'Boliden salt'. Better fixation of the same active substances has additional advantages, among them a very high resistance to electric conductivity. Since all components have been incorporated in the new product, no additional zinc sulphate is needed (**1**; Feb. 1951).

Switzerland. The avalanches of the winter of 1950-51 in Switzerland are estimated to have devastated 749 ha. of forest comprising 102,740 cu.m. of standing timber and 2,593 ha. of arable

land; destroyed or damaged 1,059 buildings; and killed 92 persons and 530 domestic animals (**13**; April 1951).

U.S.A. Forest research studies will be carried out under an 8-year co-operative agreement between the Publishers Paper Company of Oregon City and the U.S. Forest Service. Under the agreement, the company will cut 40 million bd.ft. of timber in the Cascade Head Experimental Forest on the Oregon coast, purchasing it from government at a valuation, and logging according to plans drawn up by the Forest Service. Initial studies will be made on various types of clear and selective logging in the coastal Spruce/Hemlock forests; different sizes, shapes and arrangements of felling areas with reference to windthrow; regeneration on different types of cut-over land; and comparative costs and efficiency of horse and tractor logging. Experiments are also to be made in poisoning trees before felling, in order to reduce their weight (**9**; March 1951).

A large-scale co-operative enterprise is being launched for the afforestation of sub-marginal lands in Georgia. The railway corporations and banks and the Georgia Forestry Commission are taking part in the scheme, which envisages the planting of two thousand million trees on $2\frac{1}{2}$ million acres of land. The Commission will supply *ca.* 35 million seedlings to farmers and landowners in the first year at $2·50-2·75/1,000. Banks are buying tree-planting machines and lending them without charge to farmers. Already Georgia receives more income from forest products than from cotton; out of an annual income of $800 million, timber provides $300 million (**10**; 2.2.51).

A project now in the early stages of investigation and planning proposes to construct a 'tree-ring calendar' for the Inland Empire of eastern Washington, Oregon, British Columbia and the western slopes of Idaho, similar to that already worked out for Arizona and New Mexico. One difficulty to be overcome is the lack of prehistoric timber remains, such as the early Hopi Indian structures of the south-west (**6**; Winter 1950/51).

The University of Idaho will be the first in America to use radioactive isotopes to study tree diseases. Certain chemicals will be treated with radioactive substances to trace their absorption by trees (**12**; March 1951).

A method of keeping a log-pond free from ice in winter has been devised by Brown's Tie and Lumber Co., McCall, Idaho. It was found that even at air temperatures as low as 20° below zero F., the water in Payette Lake remained at 38° at a depth of 10 ft. and below. One thousand feet of 1-in. pipe bored with $\frac{1}{32}$-in. holes at 80-ft. intervals was laid along the bottom, an air compressor with a capacity of 150 cu.ft. was attached to the pipe and the air was blown out through the holes, forcing the water from the lake bottom to rise to the surface. No ice formed within 100 ft. of the pipe line, so that an ice-free area of 200 × 1,000 ft. was obtained. The maximum depth was 100 ft. (**16**; May 1951).

The Grondal-Zenczak process, developed at the University of Washington, uses triethylene glycol as a solvent for separating lignin and pulp components instead of the usual acid or alkali pulping solutions. The resulting lignin complex has valuable adhesive qualities. Arrangements are being made to test the process on a commercial scale (**16**; May 1951).

A new wood preservative made by Protection Producers Ltd., Michigan, under the trade name 'Woodlife', is a balanced blend of toxicants (pentachlorophenol, tetrachlorophenol and 2-chlorothophenyl-phenol) and water-repellents. It is a colourless product that leaves no smell and does not discolour the wood. The treatment [? cold soaking in a tank] is said to protect wood from warping, swelling, shrinkage, checking and grain-raising, and from attack by termites, woodborers, rot and blue stain. It is said to be an excellent primer (**4**; March 1951).